

Singidunum University Belgrade
Department for Business Economics

MASTER DISSERTATION

**Business Performance Analysis of the Leading
Payment Card Networks**

Supervisor: Nemanja Stanisic, PhD

Student: Nino Veskovic 2015/401077

Belgrade, Summer 2016

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by

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Abstract

In an earlier paper entitled “Financial Statement Analysis: Imlek Inc., Mlekara Subotica Inc. and Somboled Ltd” we introduced a financial statement analysis approach whose conclusions were presented in the context of the interests of all the relevant stakeholders in society. In the first part of this paper, we reiterate the same approach by observing the leading payment card networks; Visa Inc. (V), Mastercard Inc. (MA), and American Express Company (AXP). Our results confirm current claims about the crisis that AXP is facing nowadays, since it is the least profitable and liquid company within our sample; moreover, it is the most leveraged company. The second part is related to the corporate valuation analyses, based on our sample companies. Our estimated prices of Visa Inc., MasterCard Inc., and the American Express Company are \$88.6, \$115, and \$75.89 per share, respectively. Finally, the third part of this paper is related to the technical analysis. In order to find the most suitable and still useful tools, we provide a back-test analysis for the various technical analysis indicators for each and every sample company for the period between January and July 2016. We found that most of the technical analysis indicators have both advantages and disadvantages; they work properly only under specific circumstances and indeed indicate a buy or a sell signal.

Keywords: financial statements analysis, technical analysis, corporate evaluation, DCF, payment cards networks.

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Introduction

Payment card organizations are present nowadays in almost every country in the world. There is, however, an important distinction between payment card companies and payment card networks. Generally speaking, the three major payment card networks nowadays are Visa Inc., MasterCard Inc., and the American Express Company. Payment card companies, on the other hand, are usually banks whose basic functions are issuing cards and managing consumers' bank accounts.

How significant a role these payment card networks play nowadays can be explained by the following facts: (i) Visa Inc. conducts business in more than 200 countries and territories worldwide; (ii) the American Express Company has 117.8 million cards-in-force; (iii) in *Fortune's* (2015) "Change the World" list MasterCard Inc. ranks 11th out of 51 companies that have had a great impact on major global social or environmental problems as part of their competitive strategy. Nevertheless, the most attractive payment card network is the American Express Company due to the fact that a part of the company is owned by Berkshire Hathaway Inc., whose chairman & CEO is Warren Edward Buffet, one of the most successful investors in the world.

In an earlier paper entitled "Financial Statement Analysis: Imlek Inc., Mlekara Subotica Inc. and Somboled Ltd" we introduced a financial statement analysis approach whose conclusions were presented in the context of the interests of all the relevant stakeholders in society (*Figure 1*). In the first part of this paper, we reiterate the same approach by observing the previously mentioned leading payment card networks. Therefore, the first principal goal of this paper – and hence one of its potential key contributions – is to investigate the interests of all these companies' relevant stakeholders.

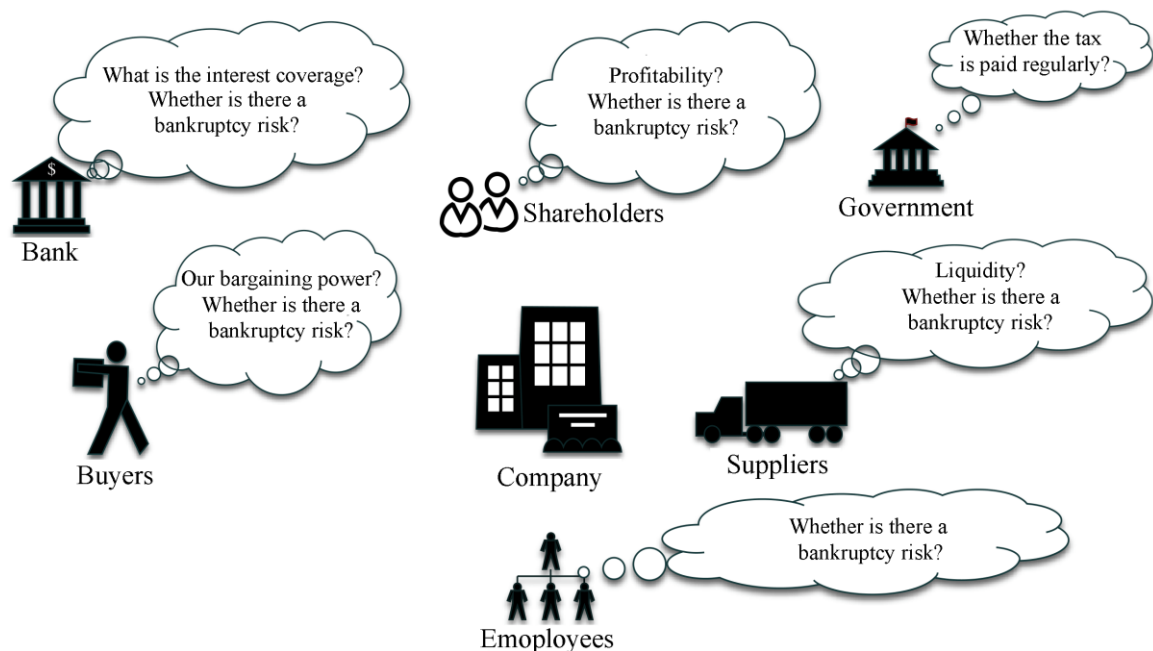


Figure 1 The Goal of the Analysis
Source: adopted from Stanišić (2015)

In the second part of this paper, we carry out the corporate valuation analyses based on our sample companies. As the last year of our forecast, 2023 is used. Therefore, the second principal goal of this paper is to present the corporate valuation analysis and its interpretation.

Finally, the third part is related to the technical analysis of these companies. Despite an overwhelming number of critics of technical analysis, it is still used, and is argued by many as being a very powerful tool in trading activity. As noted by Lawrence et al. (1994), the technical analysis of market data has long been a pervasive activity in both the security and futures markets. According to Brock et al. (1992), technical analysis is considered by many to be the original form of investment analysis, dating back to the 1800s. They believe that technical analysis came into widespread use before the period of extensive and fully disclosed financial information, which in turn enabled the practice of fundamental analysis to develop.

It is important, however, to define the term technical analysis; in that sense, we acknowledge the explanation given by Edwards et al. (2007) in their book *“Technical Analysis of Stock Trends.”* They define technical analysis in the following way:

“Technical analysis is the science of recording, usually in graphic form, the actual history of trading (price changes, volume of transactions, etc.) in a certain stock or in “the Averages” and then deducing from the pictured history the probable future trend (Edwards et al., 2007 p 4).”

In this part of the paper, we intend to show and explain some of the most commonly used indicators in technical analysis. Therefore, the second principal goal of this paper – and hence one of its potential key contributions – is to present technical analysis based on our sample companies.

The structure of this paper is as follows. In the following section we discuss the research methodology. After presenting the research results we conclude with a short discussion and provide recommendations for future research.

Methodology

The financial statement analysis was carried out from two different aspects, (i) quantitative and (ii) qualitative. The quantitative approach is used first in this paper. For the purposes of analysis, we collected financial statements for the observed companies. These companies' financial reports were collected from the official online data service maintained by Google Finance. As a precaution we carried out a double-checking procedure on the financial statements by using the official database maintained by Edgar Online¹, a division of R.R. Donnelley & Sons Company. The financial statements for the accounting periods 2012, 2013, 2014, and 2015 were acquired and analyzed for each company.

The influence of corporate leverage on business activity is analyzed by the Debt ratio and the Interest Bearing Debt to Assets ratio, respectively. As noted by Wahlen et al. (2010), analysts use debt ratios to measure the amount of liabilities, particularly long-term debt, in a firm's capital structure. The debt ratio is the share of external sources to total assets (Veskovic, 2016). In other words, it is a percentage of assets financed by creditors. We calculate this ratio by using the following equation (no. 1):

Equation 1 Debt Ratio

$$\text{Debt Ratio} = \frac{\text{Total Liabilities}}{\text{Total Assets}} \times 100$$

Knezevic et al. (2013) point out that the Interest Bearing Debt to Assets ratio takes into consideration the fact that sources of financing do not all come with equal conditions; some of them bear interest as the cost of financing, whereas other sources are considered as interest-free financing. *Equation 2* provides the calculation for this ratio.

Equation 2 Interest Bearing Debt to Assets Ratio

$$\frac{\text{Long Term Debt} + \text{Notes Payable} / \text{Short Term Debt} + \text{Current Port. of Debt} / \text{Capital Leases}}{\text{Total Assets}} \times 100$$

As known from basic economics, there are many definitions of the term liquidity. Brealey et al. (2007) define liquidity as the ability to sell or exchange an assets for cash in the short term; Mankiw and Taylor (2006), in their great book “*Economics*”, provide a similar definition. On the other hand, Kirkpatrick II and Dahlquist (2013) explain liquidity in a slightly different way by defining it as the ability of the market to absorb a reasonable amount of transactions with a minimum effect on prices.

The most suitable definition, however, that is needed for further analysis in this paper is the following one, given by Veskovic (2015, p 42): “Liquidity is defined as the ability of the company to regularly meet its short-term obligations”.

For the liquidity purposes the Current ratio and Quick ratio are used. As can be seen in *Equation 3*, the current ratio represents the relationship between current assets and current liabilities after prepaid expenses and accrued expenses are subtracted, respectively.

Equation 3 The Current Ratio

$$\text{Current Ratio} = \frac{\text{Total Current Assets} - \text{Prepaid Expenses}}{\text{Total Current Liabilities} - \text{Accrued Expenses}}$$

The Quick Ratio is indeed similar to the Current ratio (see *Equation 4*), but as Andrews (1968) points out, it is a more rigorous measure of liquidity because it excludes the inventory from the current assets.

Equation 4 The Quick Ratio

$$\text{Quick Ratio} = \frac{\text{Total Current Assets} - \text{Prepaid Expenses} - \text{Total Inventory}}{\text{Total Current Liabilities} - \text{Accrued Expenses}}$$

As for the last measure of liquidity, we use the cash percentage indicator, calculated by the following equation (no. 5):

Equation 5 Cash Percentage

$$\text{Cash Percentage} = \frac{\text{Cash \& Equivalents}}{\text{Total Assets}} \times 100$$

By its basic definition, profit is known as the difference between the total revenues and total costs of a company. It has been the major goal and motivation for setting up a business throughout the history. Consequently, some of the greatest economists, such as Smith (1776) and Ricardo (1817) wrote about its importance. In order to explain profitability of the observed companies, we use (i) the Net Margin, (ii) the Return on Equity, (iii) the Operating Margin, (iv) the Return on Assets, and (v) the Return on Invested Capital indicator.

First let consider the Net Margin or the usually called Net Profit Margin Ratio. As indicated in *Equation 6*, it represents the relationship between company's net income and total revenue. Andrews (1968) notes that the net profit margin ratio measures how much profit out of each sales dollar is left after all expenses are subtracted.

Equation 6 Net Margin

$$\text{Net Margin} = \frac{\text{Net Income}}{\text{Total Revenue}} \times 100$$

The Return on Equity (ROE) is a considerable ratio particularly for the shareholders of a company, since it represents the growth rate of equity value. Shareholders long for a positive value of this indicator, as it refers to good business performance, whereas a negative value indicates poor performance. Gildersleeve (1999) argues that high ROEs typically drive up share prices, nevertheless, it should be noted that the high current value of ROE does not guaranty the high value in the future. Consequently, it is not such a perfect indicator for share price estimation. *Equation 7* shows the ROE calculation.

Equation 7 Return on Equity (ROE)

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Total Equity}} \times 100$$

As can be seen in *Equation 8*, the Operating Margin ratio represents the relationship between the operating income and total revenue. In other words, it refers to company's earnings capacity for each dollar of sales.

Equation 8 Operating Margin

$$\text{Operating Margin} = \frac{\text{Operating Income}}{\text{Total Revenue}} \times 100$$

The Return on Assets (ROA) is indeed one of the most important ratios in company's profitability assessment procedure. It measures company's profitability relative to its assets. The ratio is calculated by the following equation (no. 9):

Equation 9 Return on Assets (ROA)

$$\text{Return on Assets} = \frac{\text{Operating Income}}{\text{Total Assets}} \times 100$$

According to Dorsey (2011), the Return on Invested Capital (ROIC) is a sophisticated way of analyzing return on capital that adjusts for some peculiarities of ROA and ROE. *Equation 10* shows the calculation of the ROIC.

Equation 10 Return on Invested Capital (ROIC)

$$\text{Return on Invested Capital} = \frac{\text{Operating Income}}{\text{Invested Capital}} \times 100$$

where

$$\text{Invested Capital} = \text{Total Assets} - \text{Accounts Payable} - \text{Accrued Expenses} - \text{Other Current Liabilities} \\ - \text{Cash and Short Term Investments}$$

The Operating leverage represents the degree to which a particular project incurs a combination of fixed and variable costs. As shown by Brigham (1979), the degree of operating leverage rises with every increase in fixed cost in the total structure of the company. In a short period of time, the fixed costs remain unchanged, whereas the variable costs value varies with the volume of business activity accordingly.

In order to estimate the expected value of the net income in different levels of business activity, break even analysis is used. In his book “*Mathematical Finance*”, published by John Wiley & Sons, Inc., Alhabeeb (2012, p 249) explains it in a proper way:

“Break-even analysis is an important technical tool for business performance and profit planning that utilizes restructuring the fundamental relationships between costs and revenues.”

We apply the so called *top-down* method, presented by Knezevic et al. (2013), with the following linear model (Equation 11):

Equation 11 Top-Down linear model

$$\text{Net Income} = \text{Contribution Margin} \times \text{Revenue} - \text{Fixed Costs}$$

The model itself is based on the assumption that by application of the statistical linear regression technique, with the previously described linear model (Equation 11), it is possible to determine the values of its parameters from historical financial data in order to adequately quantify the link between the net income and revenue.

The Contribution Margin is calculated by Equation 12.

Equation 12 Contribution Margin

$$\text{Contribution Margin} = \frac{\text{Product Revenue} - \text{Product Variable Costs}}{\text{Product Revenue}}$$

The basic break even formula shows the relationship between the fixed costs and contribution margin (see Equation 13). In other words, it refers to the amount of revenues when the expected net income equals zero.

Equation 13 Break Even

$$\text{Break Even} = \frac{\text{Fixed Costs}}{\text{Contribution Margin}}$$

In this paper, the two types of break-even analysis are taken into consideration; The Break Even Net Income Version and Break Even Operating Income Version, calculated by *Equations 14* and *15*, respectively.

Equation 14 Break Even Net Income Version

$$\text{Break Even Net Income Version} = \frac{\text{Fixed Costs Net Income Version}}{\text{Contribution Margin Net Income Version}}$$

Equation 15 Break Even Operating Income Version

$$\text{Break Even Operating Income Version} = \frac{\text{Fixed Costs Operating Income Version}}{\text{Contribution Margin Operating Income Version}}$$

There are, however, many shortcomings of using the break-even analysis. Stanišić and Knežević (2014) point out that its assumptions are often not met in reality, which decreases its practical applicability. Their results show that break even analysis is generally unreliable for real data and that its results are frequently flawed. In order to test our results and the confidence of the analysis, we follow the standards, established by the same authors: (i) the estimated values fall in the range of values expected on the basis of economic logic, and the R^2 value is above the defined threshold (0.65 is used as the threshold); (ii) checking whether the results of the “operating” form are consistent with economic logic.

As known, short-term investments account contains all investments that will expire within one-year period of time, whereas long-term investments account reflects all investments that a company intends to hold for more than a year. In order to measure the relationship between the short-term investments and total assets, and the long-term investments and total assets, *Equations 16* and *17* are used, respectively.

Equation 16 Short-Term Financial Investments as Percentage of Total Assets

$$\text{Short Term Financial Investments as Percentage of Total Assets} = \frac{\text{Short Term Investments}}{\text{Total Assets}} \times 100$$

Equation 17 Long-Term Financial Investments as Percentage of Total Assets

$$\text{Long Term Financial Investments as Percentage of Total Assets} = \frac{\text{Long Term Investments}}{\text{Total Assets}} \times 100$$

In a nutshell, Selling, General & Administrative Expense (SG&A) refers to the sum of all direct and indirect selling expenses and all general and administrative expenses of a firm. For the SG&A as a percentage of the total operating expense estimation purposes, *Equation 18* is used.

Equation 18 SG&A as Percentage of Total Operating Expense

$$\text{SG\&A as Percentage of Total Operating Expense} = \frac{\text{Selling/General/Admin. Expenses, Total}}{\text{Total Operating Expense}} \times 100$$

As a type of operating expense, Research and Development (R&D) Expenses are any expenses associated with the research and development of a company's goods or services

(Investopedia, 2016b). Equation 19 shows the relationship between the R&D expenses and total operating expenses.

Equation 19 R&D as Percentage of Total Operating Expense

$$R\&D \text{ as Percentage of Total Operating Expense} = \frac{\text{Research \& Development}}{\text{Total Operating Expense}} \times 100$$

The depreciation and amortization both are considerable features of total operating expense. Therefore, it is useful to measure the depreciation and amortization as a percentage of total operating expense (Equation 20).

Equation 20 Depreciation and Amortization as Percentage of Total Operating Expense

$$\text{Depreciation and Amortization as Percentage of Total Operating Expense} = \frac{\text{Depreciation/Amortization}}{\text{Total Operating Expense}} \times 100$$

For the credit risk assessment purposes, we use the discriminant analysis model developed by Edward I. Altman², professor of finance at New York University's Stern School of Business. In further analysis, a revised Z-Score model, introduced by Altman (2002), is used; the model itself is a complete reestimation of the Altman's model from 1968, substituting the book values of equity for the Market Value in X_4 ; moreover, the coefficients used within the model were also changed. The revised Z-Score model with a new X_4 variable is shown in Equation 21.

Equation 21 Altman's Discriminant Function

$$Z = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5$$

where³

$X_1 = \text{Working Capital} / \text{Total Assets}$

$X_2 = \text{Retained Earnings} / \text{Total Assets}$

$X_3 = \text{Earnings Before Interest and Taxes} / \text{Total Assets}$

$X_4 = \text{Book Value of Equity} / \text{Total Liabilities}$

$X_5 = \text{Total Revenue} / \text{Total Assets}$

As shown in Figure 2, any firm with a Z score greater than 2.9 should be considered a low default risk firm; between 1.23 and 2.9, an indeterminate default risk firm; and less than 1.23 should be considered a high default risk firm.

$Z > 2.9$ – “Safe” Zone

$1.23 < Z < 2.9$ – “Gray” Zone

$Z < 1.23$ – “Distress” Zone

Figure 2 Zones of Discrimination

There is, however, an overwhelming number of problems in using the discriminant analysis model to make a credit risk evaluation. The following problems are listed by Saunders and Cornett (2014):

1. Discrimination only between two extreme cases of borrower behavior: no default and default.
2. No economic reason to expect that the weights in the discriminant function-or, more generally, any credit scoring model-will be constant over any but very short periods.
3. Ignorance of important, hard-to-quantify factors that may play a crucial role in the default or no default decision.
4. Absence of centralized database on defaulted business loans.

Instead of using the previously mentioned zones discrimination classification, the score conversion into implied bankruptcy quasi-probability might provide more useful results. This is calculated by the following formula (*Equation 22*):

Equation 22 Z Score Implied Bankruptcy Probability for Private Firms

$$P = 1 - \frac{e^z}{1 + e^z}$$

As our main object of the financial statement analysis is to make conclusions presented in the context of the interests of all the relevant stakeholders in society, we also observe cash flows. As noted in an interested article, published by *The Economist* (2003), “profit is a concept, cash flow is reality”. Therefore, cash flows are such a considerable feature for each stakeholder. In their 1989 *the Journal of Finance* article, “Free Cash Flow and Stockholder Gains in Going Private Transactions”, Hehn and Poulsen find that premiums paid to stockholders are significantly related to undistributed cash flow. The following year, Koen's and Oberholster's book (1999), “Analysis and Interpretation of Financial Statements”, was published; the authors pointed out that the cash flow statement, developed during mid-1980's, enjoys global acceptance and has been recognized in the accounting standards of most trend setting countries.

The Free Cash Flow to Firm and Free Cash Flow to Equity are analyzed in this paper, by using *Equations 23* and *24*, respectively.

Equation 23 Free Cash Flow to Firm

$$\text{Free Cash Flow to Firm} = \text{Net Income} - \text{Net Working Capital Change} + \text{Net Capital Expenditure}$$

Equation 24 Free Cash Flow to Equity

$$\text{Free Cash Flow to Equity} = \text{Net Income} - \text{Net Working Capital Change} + \text{Debt Change} + \text{Net Capital Expenditure}$$

The DuPont model of financial analysis was, for the first time, used by Frank Donaldson Brown, a financial executive and corporate director with both E. I. du Pont de Nemours and Company and General Motors Corporation, in 1914. Nonetheless, as indicated by Veskovic (2015), throughout the time, the model has found a widespread use among both business and academic environments. The most significant research towards this topic are provided by Mark Soliman, professor of accounting at University of Southern California, Marshall School of Business. In his 2004 paper “Using Industry-Adjusted DuPont Analysis

to Predict Future Profitability”, he investigates whether using industry-adjusted DuPont analysis is a useful tool in predicting future changes in return-on-net-operating assets. In a 2008 article that appeared in the *Accounting Review*, Soliman comprehensively explores the DuPont components and contributes to the literature along three dimensions: (i) financial statement analysis literature, (ii) literature on the stock market’s use of accounting information, and (iii) literature on analysts’ processing of accounting information.

Equation 25 shows the original DuPont model, provided by Soliman (2008), that is used in further research. As seen in the equation, the ROE is basically decomposed into the three multiplicative ratios of Profit Margin, Asset Turnover, and Leverage.

Equation 25 The Original DuPont Equation⁴
Source: Adopted from Soliman (2008)

$$ROE = [Net\ Income/Sales \times Sales/Assets \times Assets/BVEquity]$$

In order to provide a comparative DuPont analysis, we use the data on the average ratios for individual economic activities, from the official online data service maintained by CSIMarket.com. As can be seen in Figure 3, the ratios for the Financial Sector in the United States of America (USA) are chosen, since it is the closest industry to our sample companies.

Financial Sector	Net Margin	13.83%	→	Return on Equity	8.62%
	Assets Turnover	0.37			
	Leverage Ratio	7.38			

Figure 3 DuPont Analysis of the Financial Sector
Source: the figure is created by the data provided by CSIMarket.com (2016)

We refer to the so-called *other indicators* for the following ratios:

- Interest Coverage Ratio
- Payout Ratio
- Sustainable Growth Rate
- Effective Tax Rate
- Age of Facility Ratio
- Net Income Volatility

The Interest Coverage Ratio is the amount of earnings available for interest payments. According to Frykman and Tolleryd (2003), this ratio should be of such magnitude as to give sufficient margin in case of a downturn or external shock. The same authors explain that in order for company debt to be classified by credit rating agencies as ‘investment grade’, the interest coverage needs to be over 2. Furthermore, they state that the financial risk should be balanced against the operative risk. For example, a high-growth biotechnology company with volatile cash flows should generally have higher interest coverage than a mature real estate company with stable historical and projected future cash flows. Equation 26 shows the calculation for this ratio.

Equation 26 Interest Coverage Ratio

$$\text{Interest Coverage Ratio} = \frac{EBIT}{\text{Cash Interest Paid, Supplemental}}$$

As noted by Veskovic (2015), John Davison Rockefeller's importance of dividend is quoted by John Lewis in a *Cosmopolitan* magazine article in 1908: "Do you know the only thing that gives me pleasure? It's to see my dividends coming in". Bagwell and Shoven (1989) refer to dividend paying equity as the most heavily taxed capital instrument available, due to double taxation; the US government first taxes corporate income, then taxes the same income again when shareholders receive dividends paid out of corporate income (Morck and Bernard, 2005). The results, given by Poterba and Summers (1984), suggest that dividend taxes reduce corporate investment and exacerbate distortions in the intersectoral and intertemporal allocation of capital. Consequently, dividends payout is not always such a desirable feature among investors. We calculate this indicator by using Equation 27.

Equation 27 Dividend Payout Ratio

$$\text{Dividend Payout Ratio} = \frac{\text{Total Cash Dividends Paid}}{\text{Net Income}} \times 100$$

In a *Journal of Economics and Finance* article, Platt et al. (1995) define Sustainable Growth Rate as the rate at which a company's sales and assets can grow if the company sells no new equity and wishes to maintain its capital structure. In other words, it is the maximum growth rate without increasing firm's leverage.

Equation 28 shows the original formula for the Sustainable Growth Rate indicator. As can be seen, if the net income is zero, the sustainable growth rate will also be zero. Moreover, if the total value of net income is paid by dividends to shareholders, the sustainable growth rate will be zero again.

Equation 28 Sustainable Growth Rate from a Financial Perspective

$$\frac{\left(\left(\frac{\text{Net Income}}{\text{Total Revenue}} \right) \times \left(1 - \frac{\text{Total Dividends Paid}}{\text{Net Income}} \right) \times \left(1 + \frac{\text{Total Liabilities}}{\text{Total Equity}} \right) \right)}{\left(\left(\frac{\text{Total Assets}}{\text{Total Revenue}} \right) - \left(\left(\frac{\text{Net Income}}{\text{Total Revenue}} \right) \times \left(1 - \frac{\text{Total Dividends Paid}}{\text{Net Income}} \right) \times \left(1 + \frac{\text{Total Liabilities}}{\text{Total Equity}} \right) \right)} \times 100$$

The simpler version of the previous formula is shown by the following equation (no. 29):

Equation 29 Simpler Formula for Sustainable Growth Rate

$$\frac{(\text{Net Margin} \times (1 - \text{Dividend Payout Ratio}) \times (1 + \text{Total Debt to Equity Ratio}))}{(\text{Total Assets to Sales} - (\text{Net Margin} \times (1 - \text{Dividend Payout Ratio}) \times (1 + \text{Total Debt to Equity Ratio})))} \times 100$$

where

$$\text{Net Margin} = \frac{\text{Net Income}}{\text{Total Revenue}} \times 100$$

$$\text{Dividend Payout Ratio} = \frac{\text{Total Dividends Paid}}{\text{Net Income}} \times 100$$

$$\text{Total Debt to Equity Ratio} = \frac{\text{Total Liabilities}}{\text{Total Equity}} \times 100$$

The Effective Tax Rate is realized tax burden on profits (Stanišić, 2013). Veskovic (2015) points out that business entities usually do not pay the nominal value of tax rate due to many different ways of tax reliefs. Nevertheless, the effective tax rates, all over the world, have varied during time. For instance, Feldstein et al. (1983), in the *Journal of Public Economics*, provide the basic time series which show that both the pretax rate of return and the effective tax rate have varies substantially during the period between 1950s and 1970s. For the calculation purposes, Equation 30 is used.

Equation 30 Effective Tax Rate

$$\text{Effective Tax Rate} = \frac{\text{Cash Interest Paid, Supplemental}}{\text{Income Before Tax}} \times 100$$

In order to get a measure of the average age of a nonprofit's facility and equipment, the Age of Facility Ratio is used. Equation 31 shows the calculation for this indicator.

Equation 31 Age of Facility Ratio

$$\text{Age of Facility Ratio} = \frac{\text{Accumulated Depreciation, Total}}{\text{Depreciation/Depletion}}$$

The qualitative aspect of the financial statement analysis is observed by carrying out both SWOT⁵ and Porter's five forces analysis. The SWOT analysis is done first followed by the Porter's five forces analysis.

According to Hill and Westbrook (1997), the attempt to improve the corporate strategy development process has fostered a range of approaches which have enjoyed different levels of support and popularity over time. Of all approaches, the SWOT analysis is undoubtedly the most popular one. Hay and Castilla note the following about the SWOT analysis:

"In practice, once an objective has been established, a multidisciplinary team representing a broad range of perspectives should carry out SWOT analysis (2006, p 2)."

This framework investigates four different aspects of business activity: 1) Strengths; 2) Weaknesses; 3) Opportunities; and 4) Threats. It has become a basic part of almost every business analysis, used by academics and practitioners both, mainly due to its simplicity and practicality.

Regardless its popularity, the literature abounds in studies based on the SWOT shortcomings. For instance, Hill and Westbrook (1997) argue that the continued use of the SWOT analysis needs to be questioned, since no-one in their research subsequently used the outputs within the later stages of the strategy process. Moreover, Pickton and Wright (1998)

claim that if used simplistically, the SWOT framework is a 'naive' tool which may lead to strategic errors.

Porter's five forces analysis that attempts to analyze the level of competition within an industry, was first suggested by Michael E. Porter⁶, Harvard Business School professor, in his article "How Competitive Forces Shape Strategy".

Porter (1979, p 138) notes:

"The strongest competitive force or forces determine the profitability of an industry and so are of greatest importance in strategy formulation"

The five forces, investigated in this paper, are:

1. Industry rivalry
2. Threat of new entrants
3. Threat of substitutes
4. Bargaining power of buyers
5. Bargaining power of suppliers

As it was indicated during the introduction section, the second part of this paper is related to the corporate valuation analysis. There are many stand-alone valuation models for measuring and managing the value of companies; the most frequently used is the discounted cash flow (DCF) model. As noted by Cornell and Cheng (1995), the DCF approach is conceptually straightforward. In this paper, we use the so-called McKinsey model, introduced by Copeland et al. (1990), who point out that the enterprise DCF model values the equity of a company as the value of a company's operations (the enterprise value that is available to all investors) less the value of debt and other investor claims that are superior to common equity (such as preferred stock).

According to Frykman and Tolleryd (2003), cash flow models in general, and the McKinsey model in particular, have become so popular and widely used due to many reasons, such as: (i) the model is theoretically correct, (ii) it corresponds well to market values, (iii) the model works well for all types of companies, (iv) it is unaffected by window dressing, and (v) it provides a good understanding of the underlying business.

However, the DCF as well as all other models used for the valuation purposes are indeed just the calculation tools. As Warren E. Buffett, one of the most successful investors in the world, states in his chairman's letter from 1996:

"Intelligent investing is not complex, though that is far from saying that is easy. What an investor needs, is the ability to correctly evaluate selected businesses. Note that word "selected": You don't need to be an expert on every company, or even many. You only have to be able to evaluate companies within your circle of competence. The size of that circle is not very important; knowing its boundaries, however, is vital."

Therefore, the main object of this analysis has primarily the educational character and its results should not be interpreted as a professional valuation on the basis of which investment decisions can be made.

The evaluation was divided into the following four main sections (Frykman and Tolleryd, 2003):

1. Estimating the cost of capital – WACC
2. Calculating free cash flow
3. Computing terminal value
4. Discounting and final corporate value

The analysis was carried out by using *Trefis*⁷ online platform. For the data collection purposes, the company finings provided by the SEC were used. As comparable corporate valuation analyses, the official reports maintained by the same platform, that was used for the analysis, were observed.

Despite the various cost of capital estimation methods, both the academics and practitioners often use the weighted average cost of capital (WACC). In a *Financial Management* article, Arditti and Levy (1977) show that virtually all textbooks recommend that the WACC should be used as a cutoff rate for investment decision-making. Nevertheless, Miles and Ezzell (1980) state that although it is usually accepted that the WACC is an appropriate discount rate for either of the popular assumptions (1) a one-year project life or (2) level of perpetual project cash flows, a number of authors have argued that this approach does not generally provide correct valuations of uneven finite cash flows (see Arditti, 1973; Brick and Thompson, 1978; Myers, 1974; Reilly and Wecker, 1973). The WACC is calculated by *Equation 32*.

Equation 32 Weighted Average Cost of Capital (WACC)

$$WACC = \frac{E}{D + E} \times C_E + \frac{D}{D + E} \times C_D \times (1 - T)$$

where

E – market value of equity

D – market value of debt

C_e – the cost of equity

C_d – the cost of debt

T – tax rate

In order to estimate the cost of equity, the capital asset pricing model, developed by Sharpe (1964, 1970), is the most commonly used method, calculated by the following equation (no. 33).

Equation 33 Capital Asset Pricing Model (CAPM)

$$E_r = r_f + \beta(r_m - r_f)$$

where

E_r – expected return

r_f – risk free rate

β – beta of the stock

r_m – expected market return

The Capital Assets Pricing Model, with no doubt, serves as the foundation of financial econometrics nowadays; nevertheless, this model has been criticized throughout the literature (see Merton (1973), Mullins Jr (1992), Dempsey (2013), Moosa (2013), Welch and Levi (2014), Yue and Hoven (2015)). The greatest papers against this model, however, were given by Pablo Fernandez (2014b, 2014a), a professor of financial management at IESE Business School of the University of Navarra.

Consequently, in order to prevent the possible failure of the CAPM model, we use a conservative discount rate of 9%, which is a logic implementation of the research, provided by Fernandez and Bermejo (2015).

Free cash flow is calculated by *Equation 34*.

Equation 34 Free Cash Flow

$$FCF = EBIT - tEBIT - I + D +/-CWC$$

where

FCF – free cash flow

$EBIT$ – earnings before interest and taxes

$tEBIT$ – taxes on EBIT

I – investments

D – depreciation

CWC – change in working capital

As can be seen in *Equation 35*, in order to get the free cash flow, among other indicators, taxes on EBIT need to be calculated, by using the following equation (*no. 35*).

Equation 35 Taxes on EBIT

$$tEBIT = PFIN + TSIE - TII - TNOI$$

where

$tEBIT$ – taxes on EBIT

$PFIN$ – total income tax provision from income statement

$TSIE$ – tax shield on interest expense

TII – tax on interest income

TNOI – tax on non/operating income

The next step is the estimation of the explicit forecast period, calculated by *Equation 36*.

Equation 36 Value today of FCF from the explicit period

$$\text{Value today of FCF from the explicit period} = \frac{FCF_1}{(1 + WACC)} + \frac{FCF_2}{(1 + WACC)^2} + \dots + \frac{FCF_t}{(1 + WACC)^t}$$

where

FCF₀ – the free cash flow value today

FCF_t – the cash flow t years into the future

WACC – weighted average cost of capital

As our sample companies do not experience the so-called hypergrowth period, the third period (between the explicit and terminal value period) is not calculated. The terminal value period is one of the most important parts of the DCF model, due to the fact that it comprises almost 70% of total enterprise value. It is calculated using the constant-growth model, explained in *Equation 37*.

Equation 37 The Terminal Value

$$TV = \frac{FCF_{t+1}}{WACC - g}$$

where

FCF_{t+1} – the cash flow in the first year after the explicit period

WACC – weighted average cost of capital

g – growth rate

In order to get the terminal value today, *Equation 38* is used.

Equation 38 The Terminal Value Discounted Back to Today

$$TV_0 = \frac{TV_{t+z}}{(1 + WACC)^{t+z}}$$

where

TV_{t+z} – the value of all cash flows from the year after the last year of the hypergrowth period to infinity

t + z – the number of years in the explicit plus hypergrowth periods

WACC – weighted average cost of capital

Finally, the total enterprise value equals the sum of *Equations 36 and 38*. The equity value is then calculated by subtracting the value of long-term debt from the total enterprise value. For the value per share calculation purposes, *Equation 39* is used.

Equation 39 Value per Share

$$\text{Value per Share} = \frac{ME}{NS}$$

where

ME – market value of equity

NS – number of common shares outstanding

For technical analysis purposes the data were collected from the *Yahoo Finance* database, and then analyzed with R Studio statistical software (packages: *Quantitative Financial Modelling Framework – quantmod*⁸ and *Technical Trading Rules – TTR*⁹). Nevertheless, in order to visualize some indicators, the *Stock Charts* platform was also used.

Kirkpatrick II and Dahlquist (2013) note that one of the most successful methods of identifying and profiting from trends is the use of moving averages; therefore, these indicators are presented in this paper first. The predictive power of the moving averages is, in a proper way, shown by Detry and Gregoire (2001), on formally selected European indexes. There are many types of moving averages, yet we analyze the following as the most significant among others: (i) the simple moving average, (ii) the weighted moving average, and (iii) the exponential moving average.

As can be seen in *Equation 40*, the numerator of the simple moving average (SMA), or usually called arithmetic moving average, represents the sum of the closing stock prices over a specific period of time, whereas the denominator represents the number of days within that period.

Equation 40 Simple Moving Average

$$\text{Simple Moving Average}_s = \frac{p_s + p_{s-1} + \dots + p_{s-(n-1)}}{n} = \frac{1}{n} \sum_{i=0}^{n-1} p_{s-i}$$

where

p_s – closing stock price

n – number of days

The SMA today is calculated by *Equation 41*.

Equation 41 Simple Moving Average Today

$$\text{Simple Moving Average}_{\text{today}} = \text{Simple Moving Average}_{\text{yesterday}} + \frac{p_s}{n} - \frac{p_{s-n}}{n}$$

where

p_s – closing stock price

n – number of days

The major shortcoming of the SMA, however, is in fact within its basic definition, which refers to this indicator as the unweighted mean of the sample data. Consequently, in order to make a more reliable indicator, the weighted moving average (WMA) is used; it assigns a heavier weighting to more current data points, since they are more relevant than data points in the distant past (Investopedia, 2014). The WMA is calculated by the following equation (no. 42):

Equation 42 Weighted Moving Average

$$\text{Weighted Moving Average}_s = \frac{np_s + (n-1)p_{s-1} + \dots + 2p_{(s-n+2)} + p_{(s-n+1)}}{n + (n-1) + \dots + 2 + 1}$$

where

p_s – closing stock price

n – number of days

Equation 43 explains the denominator of the WMA formula.

Equation 43 The Denominator of Equation 42

$$\text{The Denominator of the Weighted Moving Average} = \frac{n(n+1)}{2}$$

Ehlers and Way (2015) note that an Exponential Moving Average (EMA) is computed by taking a fraction of the current price and adding to it the quantity $(1 - \text{fraction})$ times the previously computed value of the EMA. As they explain, that fraction is called the smoothing factor, is commonly called α (alpha), and it is always less than 1.

The EMA is calculated by the following equation (Ehlers and Way, 2015):

Equation 44 Exponential Moving Average (EMA)

$$EMA = \alpha \times \text{Price} + (1 - \alpha) \times EMA[1]$$

where

EMA – exponential moving average

EMA[1] – EMA one bar ago

The relatively new so-called Aroon technical analysis indicator was developed by Dr. Tushar Chande in 1995. Generally speaking, it is a set of two separate measurements, Aroon-Up and Aroon-Down, designed to measure uptrend and downtrend, respectively. Aroon-Up is

calculated by *Equation 45*, and Aroon-Down by *Equation 46*. In further analysis, 25 is used as a number of days (n).

Equation 45 Aroon-Up

$$Aroon\ Up = \frac{n - \text{days since } n \text{ days high}}{n} \times 100$$

where

n – number of days

Equation 46 Aroon-Down

$$Aroon\ Down = \frac{n - \text{days since } n \text{ day low}}{n} \times 100$$

where

n – number of days

The next trend following indicator used in this paper is the Aroon Oscillator, which is calculated, as can be seen in *Equation 47*, by subtracting Aroon-Down from Aroon-Up. It gives a range from -100 to 100, where the zero-value line represents the main indicator.

Equation 47 Aroon Oscillator

$$Aroon\ Oscillator = Aroon\ Up - Aroon\ Down$$

Figure 4 refers to the trading signals for the Aroon Oscillator; the closer the Aroon Indicator is to 100, the stronger the trend.

$$Aroon\ Oscillator > 0 = Up\ Trend$$

$$Aroon\ Oscillator < 0 = Down\ Trend$$

Figure 4 Trading Signals for the Aroon Oscillator

Next, we analyze one of the most commonly used indicators for measuring the cumulative flow of money into and out of security, which is the Accumulation-Distribution Line (ADL), developed by Marc Chaikin, a stock analyst and founder of Chaikin Analytics. This indicator is calculated by three different steps, presented in *Equations 48, 49, and 51*, respectively.

The first step is to calculate the money flow multiplier that fluctuates between +1 and -1 (*Equation 48*).

Equation 48 The First Step in Calculating the Accumulation Distribution Line

$$Money\ Flow\ Multiplier = \frac{(C_t - L_t) - (H_t - C_t)}{(H_t - L_t)}$$

where

C_t – close price (t)

L_t – low price (t)

H_t – high price (t)

After the first step, the Money Flow Volume is calculated (*Equation 49*). Nonetheless, the Chaikin Money Flow is also an interesting indicator, estimated usually for a 20 or 21-day look-back period. It is calculated by *Equation 50*, which produces an oscillator that rises above zero when an upward trend begins, and declines below zero when the trend turns downward (Kirkpatrick II and Dahlquist, 2013).

Equation 49 The Second Step in Calculating the Accumulation Distribution Line

$$\text{Money Flow Volume} = \text{Money Flow Multiplier} \times \text{Volume for the Period}$$

Equation 50 Chaikin Money Flow (CMF)

$$20 \text{ Period CMF} = \frac{20 \text{ Period sum of Money Flow Volume}}{20 \text{ Period Sum of Volume}}$$

Finally, since we have all the necessary data, the ADL can be calculated (*Equation 51*).

Equation 51 Accumulation-Distribution Line (ADL)

$$ADL = \text{Previous ADL} + \text{Current Period's Money Flow Volume}$$

A similar indicator to the Chaikin Accumulation-Distribution line is the On Balance Volume (OBV) measure. This indicator measures buying and selling pressure as a cumulative indicator that adds volume on up days and subtracts volume on down days (StockCharts, 2016). Whether there is a change in volume or not according to this measure can be seen in *Figure 5*.

$$OBV = OBV_{prev} + \begin{cases} \text{volume} & \text{if close} > \text{close}_{prev} \\ 0 & \text{if close} = \text{close}_{prev} \\ -\text{volume} & \text{if close} < \text{close}_{prev} \end{cases}$$

Figure 5 On-Balance Volume (OBV)

In the following part, we observe volatility. As explained by Zivot and Wang (2006), the Chaikin Volatility indicator compares the spread between a security's high and low prices, and quantifies volatility as a widening of the range between a high and low price. It is calculated by the following equation (no. 52).

Equation 52 Chaikin Volatility

$$\text{Chaikin Volatility} = \frac{EMA(H_t - L_t) - EMA(H_t - L_t \text{ 10 days ago})}{EMA(H_t - L_t \text{ 10 days ago})} \times 100$$

where

EMA – exponential moving average

L_t – low price (t)

H_t – high price (t)

In his 1987 book “*New Concepts in Technical Trading Systems*,” J. Welles Wilder JR, an American mechanical engineer, features the Average True Range (ATR) as an indicator used to measure volatility. This indicator is calculated by *Equation 53*.

Equation 53 Average True Range (ATR)

$$ATR_{latest} = \frac{13 \times ATR_{previous} + Today's \text{ True Range}}{14}$$

where

Today's True Range = Current High – Current Low

Moreover, J. Welles Wilder JR developed a technical momentum indicator called the Relative Strength Index (RSI), which compares the magnitude of recent gains to recent losses in an attempt to determine the overbought and oversold conditions of an asset (Investopedia, 2016a). It is calculated by *Equation 54*, which indicates the RSI oscillations between 0 and 100.

Equation 54 Relative Strength Index (RSI)

$$\text{Relative Strength Index} = 100 - \frac{100}{1 + RS}$$

where

$$RS = \frac{\text{Average Gain}}{\text{Average Loss}}$$

Quong and Soudack (1989) point out that the RSI's failure to account for volume is a serious deficiency because volume can vary widely in market tops and bottoms. Consequently, in the belief that the RSI can be improved by using volume to weight the index, they developed an advanced version of the RSI; a unique short-term indicator called the Money Flow Index (MFI). In order to estimate the MFI, the Average Price (AV) needs to be calculated first (*Equation 55*), followed by the Money Flow (MF) for a particular day (*Equation 56*). After that, the Money Ratio (MR) is calculated (*Equation 57*), and finally the MFI (*Equation 58*). As for the time period, a 14-day period, as proposed by the same authors, is used.

Equation 55 Average Price (AV)

$$AV = \frac{H + L + C}{3}$$

where

H – high

L – low

C – close

As Quong and Soudack (1989) explain, when today's average price is greater than yesterday's average price, then it is an up, or positive, day for money flow, and vice versa. Nonetheless, as seen in *Equation 27*, a positive MF is the sum of a daily positive MF during the 14-day period used in the analysis, whereas a negative MF is the sum of a daily negative MF during the same period.

Equation 56 Money Flow (MF)

$$MF = Volume \times AV$$

Equation 57 Money Ratio (MR)

$$MR = \frac{Positive\ MF}{Negative\ MF}$$

Equation 58 Money Flow Index (MFI)

$$MFI = 100 - \frac{100}{1 + MR}$$

One of the most commonly used and simplest trading indicators in technical analysis is the Moving Average Convergence-Divergence Oscillator, developed by Gerald Appel in the 1960s. As can be seen from *Equation 59*, it compares a 12-day period, or the fast exponential moving average of a series, with a 26-day period, or slow exponential moving average, of the same series.

Equation 59 Moving Average Convergence-Divergence Line

$$MACD\ Line = 12\ day\ EMA - 26\ day\ EMA$$

where

MACD – moving average convergence/divergence

EMA – exponential moving average

As for the signal line, the 9-day exponential moving average of the moving average convergence-divergence (MACD) line is used (*Equation 60*).

Equation 60 Signal Line

$$\text{Signal Line} = 9 \text{ day EMA of MACD line}$$

where

EMA – exponential moving average

MACD – moving average convergence/divergence

Finally, the MACD histogram (Equation 61) plots the difference between the MACD line and the signal line, since there is a continuous difference between these values.

Equation 61 MACD Histogram

$$\text{MACD Histogram} = \text{MACD line} - \text{signal line}$$

where

MACD – moving average convergence/divergence

Next we analyze the Stochastic Momentum Index (SMI), introduced by William Blau in the 1993 *Technical Analysis of Stocks & Commodities* article “*Stochastic Momentum*”. The SMI is formulated by Equation 62 (Blau, 1993):

Equation 62 Stochastic Momentum Index (SMI)

$$SMI(q, r, s) = 100 \frac{E_s \left(E_r (SM(q)) \right)}{0.5 \left(E_s \left(E_r (HH:q - LL:q) \right) \right)}$$

where

HH:q = highest high in a lookback of *q* days

LL:q = lowest low in a lookback of *q* days

$SM(q) = \text{Close} - 0.5(HH:q + LL:q) = \text{stochastic momentum}$

and

$$Asm(q) = E_s \left(E_r (SM(q)) \right)$$

= average stochastic momentum (*Asm*)

= double – smoothing of stochastic momentum

We use the basic configuration of the stochastic momentum index, proposed by the same author, for a $q = 13$ -day lookback with the EMA smoothings of 25 and 2 days, respectively. As for the signal line a 9-day EMA of the SMI is used.

In August 1992 the *Technical Analysis of Stocks & Commodities* article “Rate of Change” by Martin J. Pring, the founder of Pring Research¹⁰, presented the rate of change (ROC) oscillator, a method of figuring advances or declines in a given period. As he points out, the ROC is perhaps the simplest form of oscillator or momentum to understand and calculate. However, it gives misleading signals when a sustained or linear trend is under way. This indicator is calculated by the following equation (no. 63).

Equation 63 Rate of Change (ROC)

$$ROC = \frac{Y - Y_x}{Y_x} \times 100$$

Y – closing price today

Y_x – closing price 'n' period ago

In further analysis, the 12-day ROC is used.

In the following month’s article, entitled “Summed Rate of Change (KST)” and appearing in the same magazine, Pring (1992b) introduced his method of combining various rate of change indicators for enhanced trend and reversal of trend identification. Therefore, in order to get the Know Sure Thing (KST) indicator used in this paper, the price momentum for four different price cycles needs to be calculated first (*Equation 64*), after which the KST can be estimated (*Equation 65*). As for the signal line, a nine period simple moving average of the KST is used.

Equation 64 Price Momentum for 4 Price Cycles

$$ROCMA1 = 10 \text{ period SMA of } 10 \text{ period ROC}$$

$$ROCMA2 = 10 \text{ period SMA of } 15 \text{ period ROC}$$

$$ROCMA3 = 10 \text{ period SMA of } 20 \text{ period ROC}$$

$$ROCMA4 = 15 \text{ PERIOD SMA of } 30 \text{ period ROC}$$

where

SMA – simple moving average

ROC – rate of change

Equation 65 Know Sure Thing (KST)

$$KST = (ROCMA1 \times 1) + (ROCMA2 \times 2) + (ROCMA3 \times 3) + (ROCMA4 \times 4)$$

For oversold and overbought estimation purposes, we use the so-called Williams %R indicator, developed by Larry Williams, an American stock and commodity trader. It is calculated by *Equation 66*; as for the look-back time period, a 14-day period is used.

Equation 66 Williams %R

$$\%R = \frac{HH - C}{HH - LL} \times 100$$

where

HH – highest high

C – close

LL – lowest low

Ehlers and Way (2015)¹¹ point out that all smoothing filters and moving averages have a lag. In their paper “*Zero Lag (well, almost)*”, they show how to remove a selected amount of lag from an EMA. They calculate the Error Correcting (EC) using the following equation (no. 67):

Equation 67 Error Correcting (EC)

$$EC = \alpha \times (\text{price} + \text{gain} \times (\text{price} - EC[1])) + (1 - \alpha) \times EC[1]$$

We compare the EC and EMA with the explanation whether the stock is in a bullish or bearish mode.

Results and Discussion

As it was indicated in the methodology section, we start with the financial statement analysis of the sample companies. As can be seen in *Figure 6*, the most indebted company during the whole observed period, according to the debt ratio, was the American Express Company. This raises a significant issue for both the management and shareholders, as the company will probably not be able to use cheap external sources anymore. On the other hand, Visa Inc. was the least leveraged company. The average value of the debt ratio was 58.09% in 2015, while the median was 62.90%.

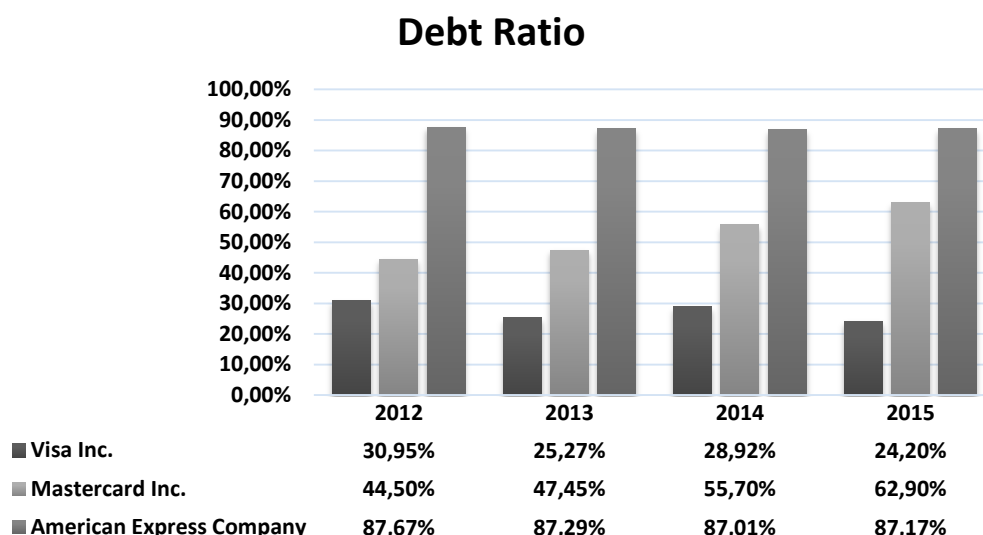


Figure 6 Debt Ratio

Interestingly, as *Figure 7* shows, Visa Inc. had no interest bearing debt during the period 2012 to 2015. MasterCard Inc., on the other hand, financed 62.90% of its assets from external sources in 2015, 20.11% of which bore interest. The interest bearing debt to asset ratio confirms that the American Express Company is the most indebted out of all those analyzed due to the fact that, for instance, it financed 87.17% of its assets by using external sources in 2015, 67.18% of which bore interest. The average value of the interest bearing debt to assets ratio in 2015 was 29.10%, whereas the median was 20.11%.

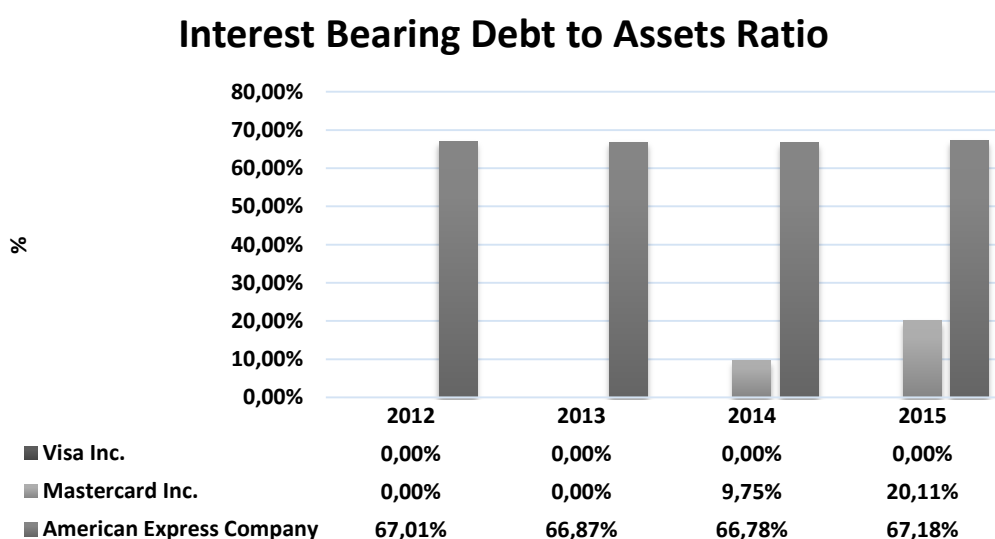


Figure 7 Interest Bearing Debt to Assets Ratio

As indicated in the methodology section, for the purposes of liquidity analysis the current ratio was used first. According to this indicator (*Figure 8*), MasterCard Inc. was the most liquid company in 2015, with a current ratio of 3.71. This means that the coverage of current liabilities with current assets was at the level of 371%. The American Express

Company was less liquid than comparable group companies during the period 2012 to 2015. The average and median values of the current ratio were 2.62 and 3.25 in 2015, respectively.

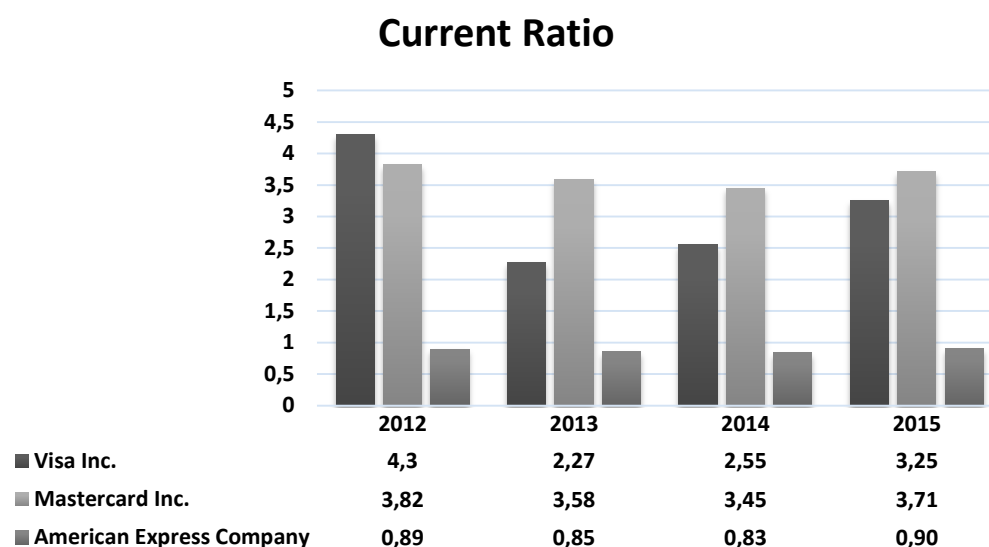


Figure 8 Current Ratio

Due to their specific industry, the companies have not carried out an inventory. Consequently, the value of the quick ratio is the same as the value of the current ratio for each company.

Figure 9 shows the relationship between cash and equivalents and total assets. As can be seen, MasterCard Inc. had the largest amount of cash relative to the value of its total assets. The average value of this indicator was 19.58% in 2015, while the median was 14.12%.

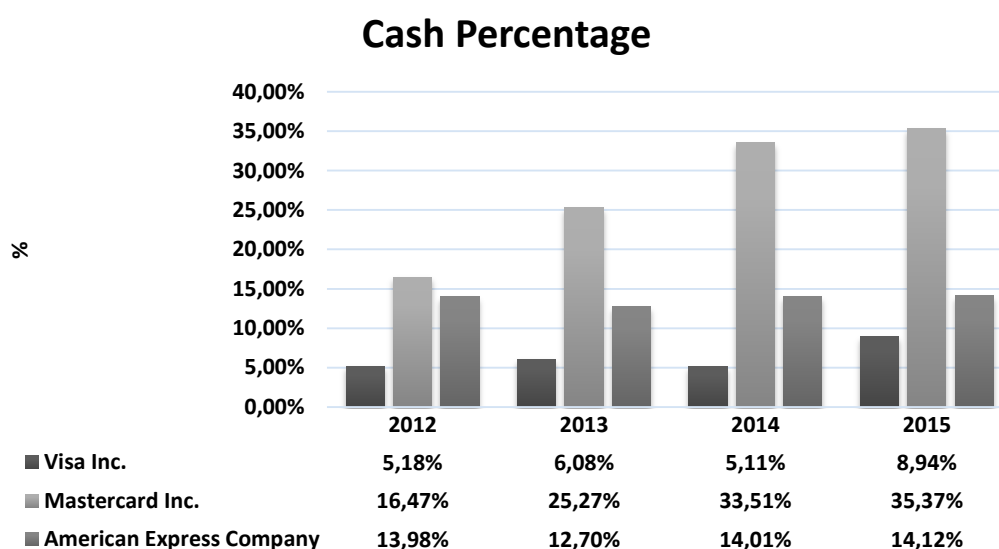


Figure 9 Cash Percentage

As can be seen in *Figure 10*, Visa Inc. had the largest share of net income in total revenue in 2015. Conversely, the net income of the American Express Company represented only 14.99% in the value of total revenue during the same year. The average value and the median value were 33.32% and 39.39% in 2015, respectively.

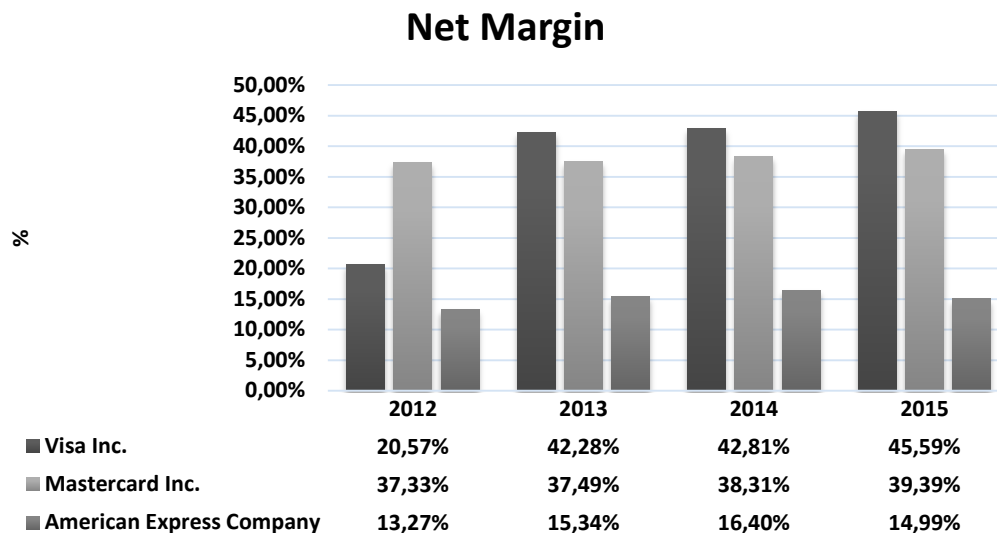


Figure 10 Net Margin

The following figure (no. 11) shows the growth rate of equity value for the sample companies. The return of equity for MasterCard Inc. was 63.17% in 2015. This means that the company generated \$0.63 of profit for every \$1 of shareholders' equity in that year. The return on equity of Visa Inc. and MasterCard Inc. increased steadily from 2012 onwards. On the other hand, the American Express Company generated a smaller value of profit for every \$1 of shareholders' equity in 2015 than in 2014. The average value of this indicator was 36.45% in 2015, while the median was 24.97% in the same year.

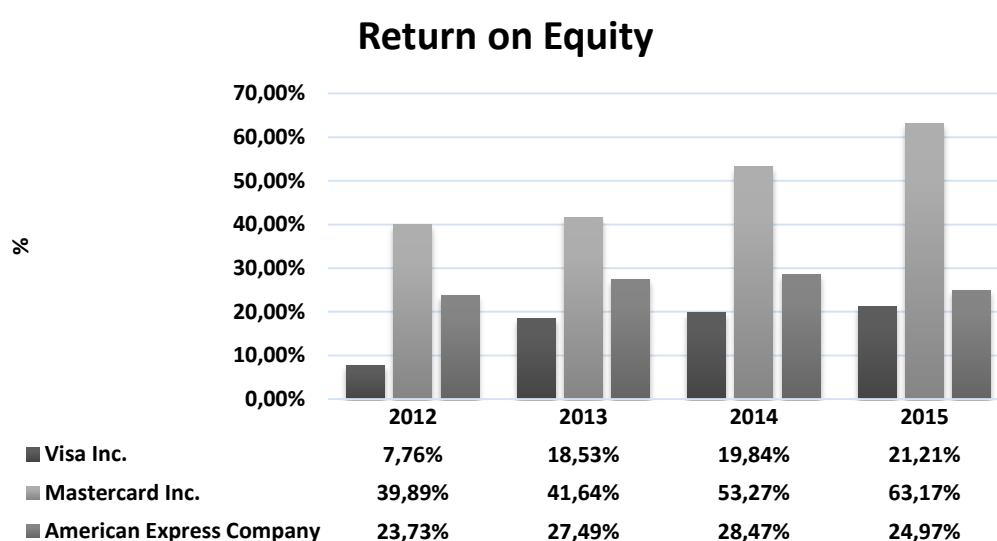


Figure 11 Return on Equity

As shown in *Figure 12*, Visa Inc. had the largest share of operating income in the value of total revenue in 2015, with an operating margin of 63.30%. The American Express Company had the smallest operating margin during the same year; for every \$1 in sales, the company made \$0.23 in operating income. The average and median values of this indicator were 46.96% and 52.53% in 2015, respectively.

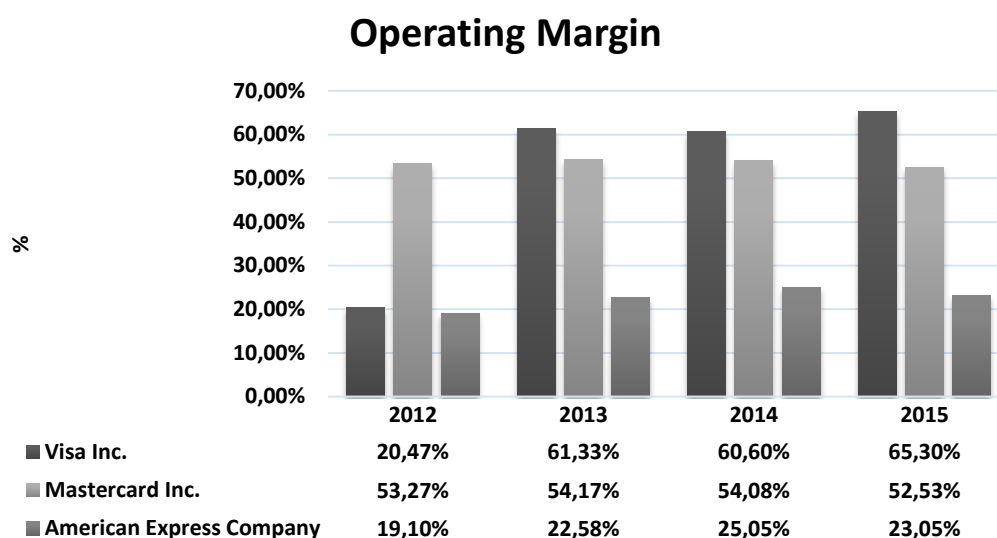


Figure 12 Operating Margin

Figure 13 shows the return on assets of the observed companies for the period 2012 to 2015. The most profitable company, according to this indicator, was MasterCard Inc. during the whole period. The average value of this indicator was 19.73% in 2015; the median was 23.02%.

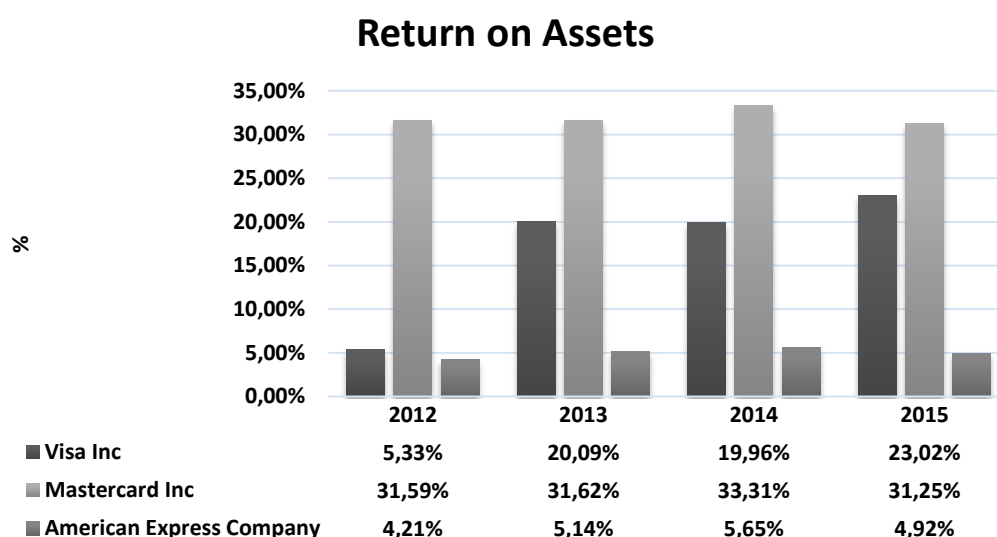


Figure 13 Return on Assets

Figure 14 shows the return on invested capital. According to this ratio, MasterCard Inc. generated much more profit for every dollar it invested than other comparable

companies. It can be seen that this company apparently developed a useful method for turning investor capital into profit. This indicator's average value was 50.81% in 2015, while the median was 19.42%.

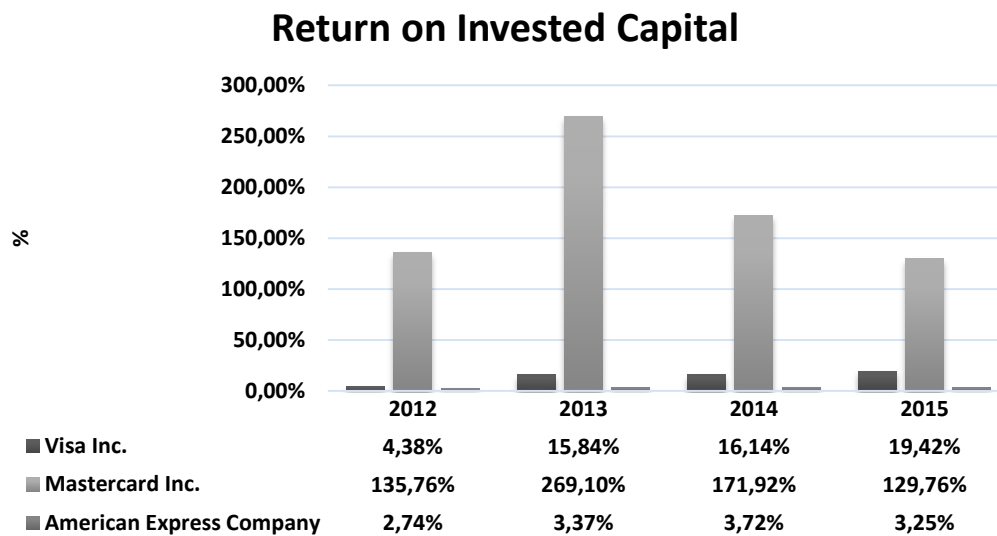


Figure 14 Return on Invested Capital

Figure 15 shows the relationship between the revenue and net income of Visa Inc. during the period 2012 to 2015. Based on a break-even analysis (net income version) that was carried out using a linear regression model, we estimate that Visa Inc. had fixed costs amounting to \$9,596.76 million in 2015 (see *Figure 16*); the contribution margin was 1.17. Therefore, the conclusion is that Visa Inc. needs to generate revenue of \$8,173.25 million in order to accomplish a neutral net income.

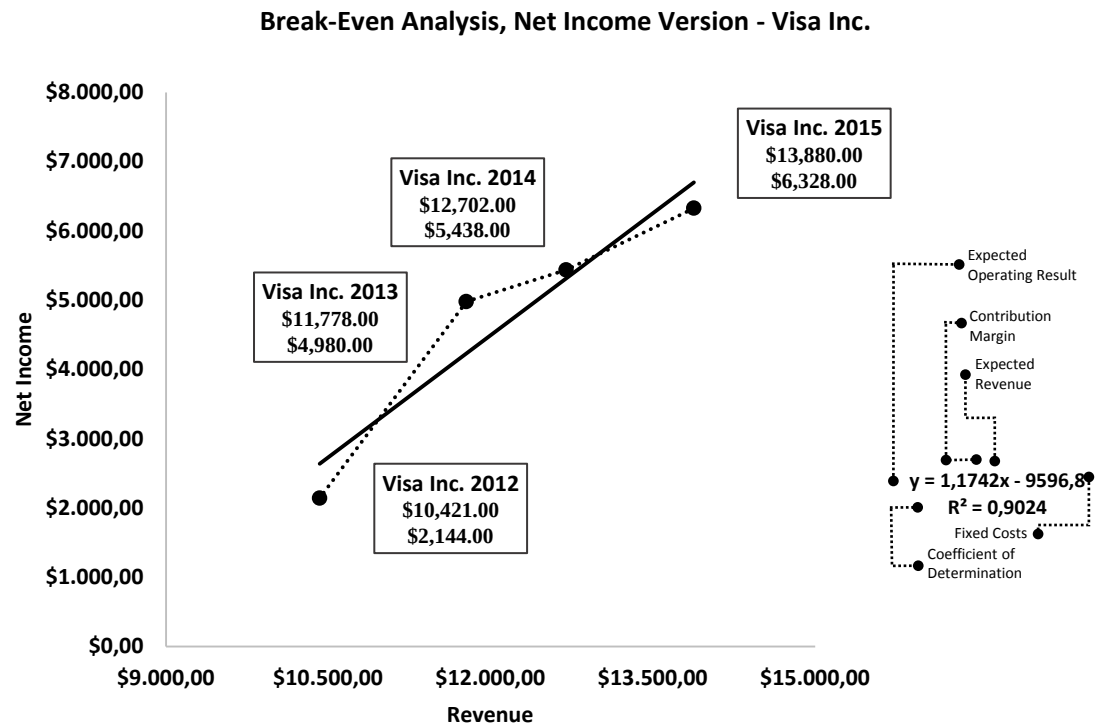


Figure 15 Break-Even Analysis, Net Income Version - Visa Inc.

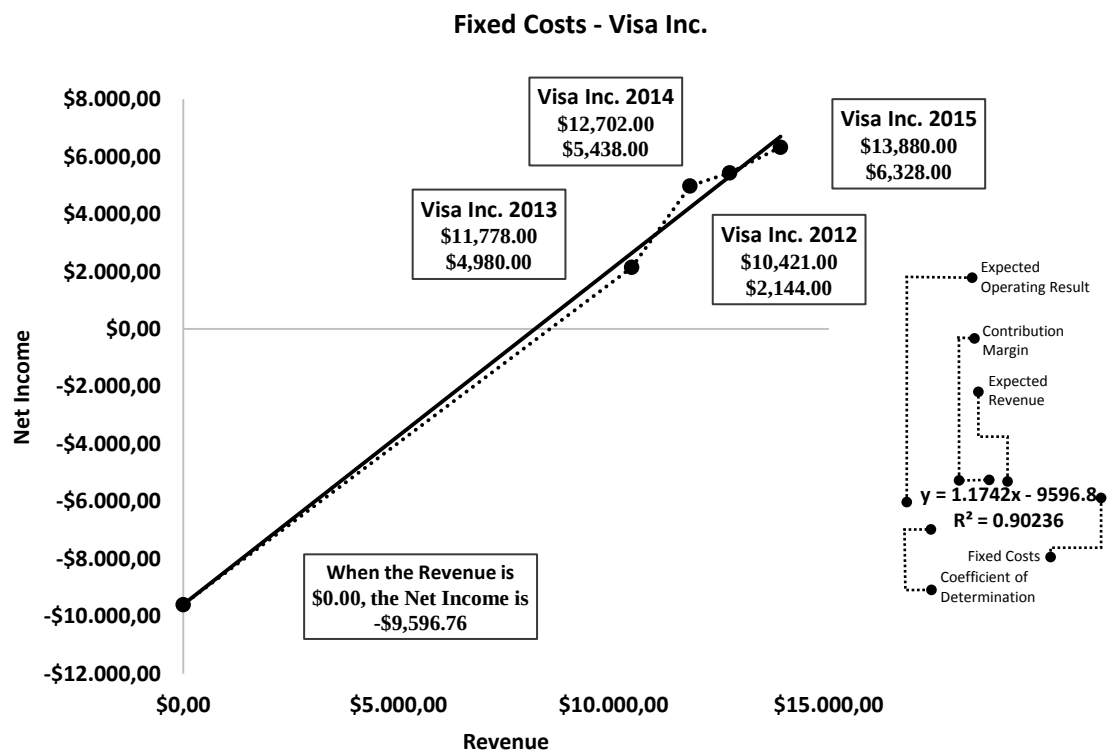


Figure 16 Fixed Costs - Visa Inc.

As can be seen in *Figure 17*, the revenue and operating income of Visa Inc. rose constantly from 2012 onwards. According to an operating income version break-even analysis, the estimated fixed operating costs were \$16,982.76 million in 2015, while the contribution margin was 1.93 (*Figure 18*). Therefore, Visa Inc. needs to generate revenue amounting to \$8,808.04 million in order to achieve a neutral operating income.

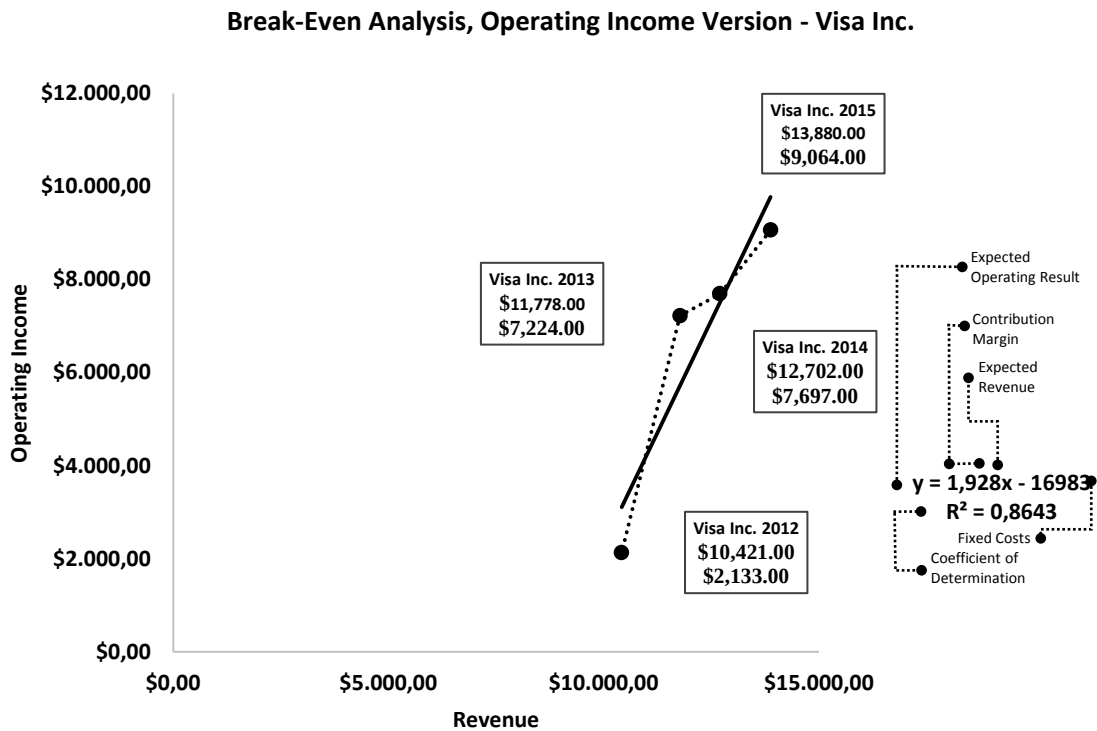


Figure 17 Break-Even Analysis, Operating Income Version - Visa Inc.

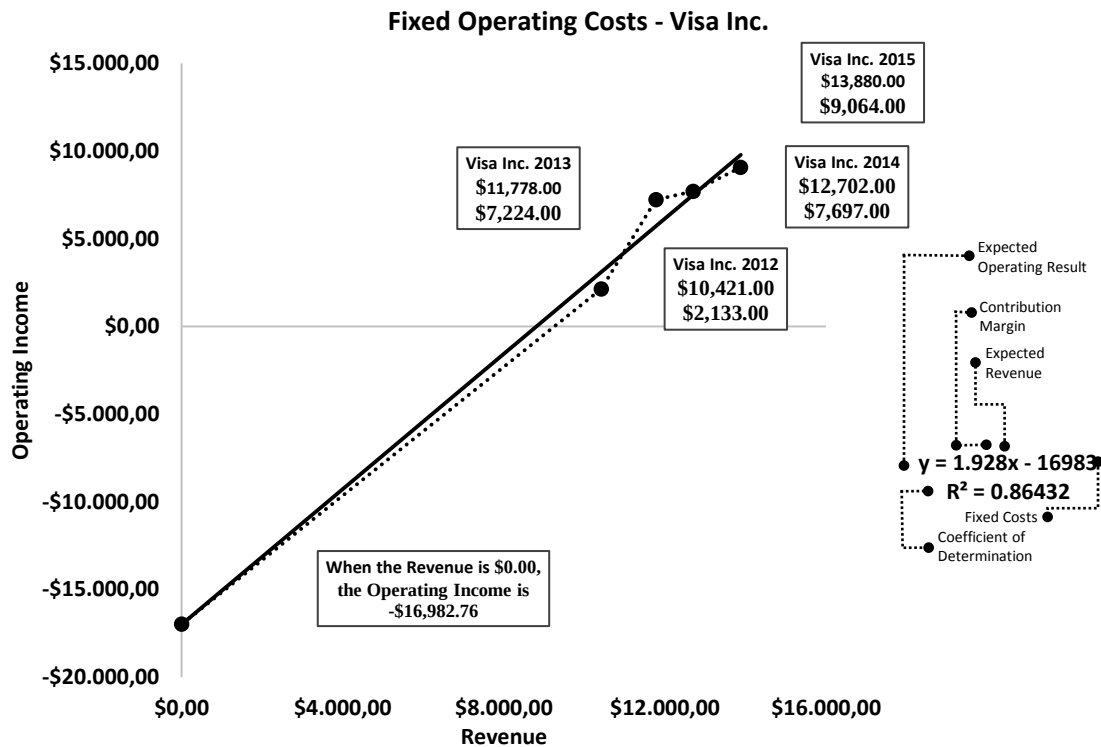


Figure 18 Fixed Operating Costs - Visa Inc.

The relationship between the revenue and net income of MasterCard Inc. is shown in Figure 19. A time series analysis of these values provides a clue that there is a mutual dependence between them. In other words, an increase in revenue raises net income accordingly. A break-even analysis (net income version) gives the following results: MasterCard Inc.'s fixed costs were \$587.97 million in 2015 (Figure 20), whereas its contribution margin was 0.45; the estimated break-even was \$1,307.70 million. This means that the company needs to generate revenue of \$1,307.70 million in order to achieve a neutral net income.

A similar situation can be seen in Figures 21 and 22, which show the relationship between MasterCard Inc.'s revenue and operating income during the period 2012 to 2015. Its revenue and net income both increased from 2012. MasterCard Inc.'s business performance, according to this analysis, might be considered as being very successful. The positive fixed operating costs (fixed revenue)¹² in 2015 are not surprising due to the company's fees being based on the users' active cards (e.g. domestic assessments¹³). As is known, these fees are pure profit (not directly related costs) for MasterCard Inc.

Break Even Analysis, Net Income Version - MasterCard Inc.

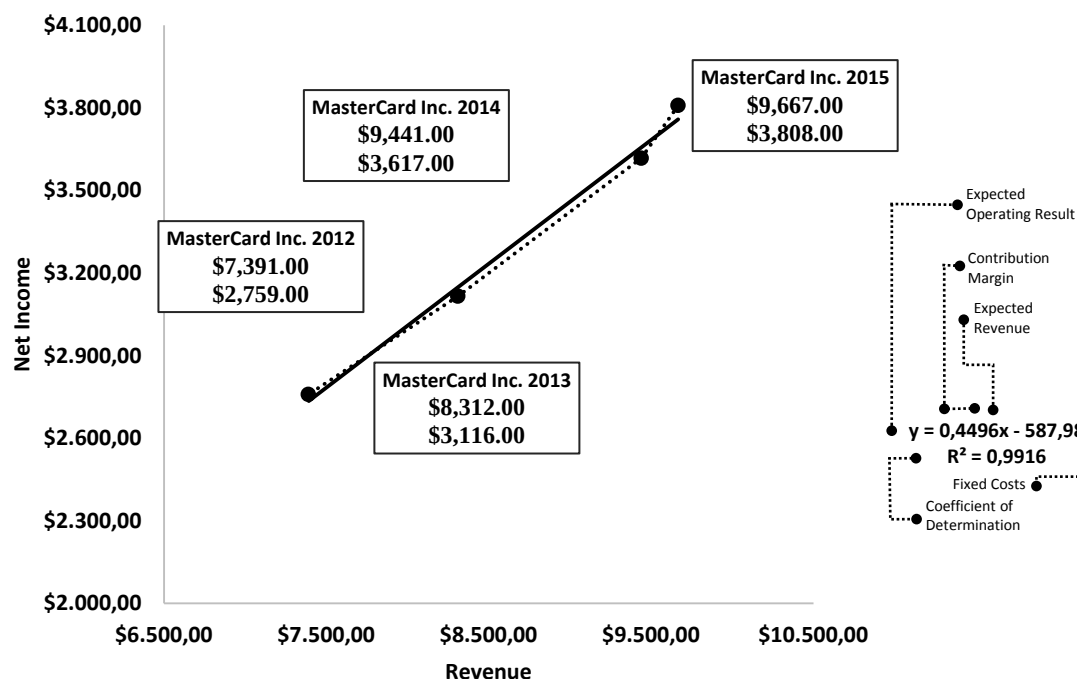


Figure 19 Break-Even Analysis, Net Income Version - MasterCard Inc.

Fixed Costs - MasterCard Inc.

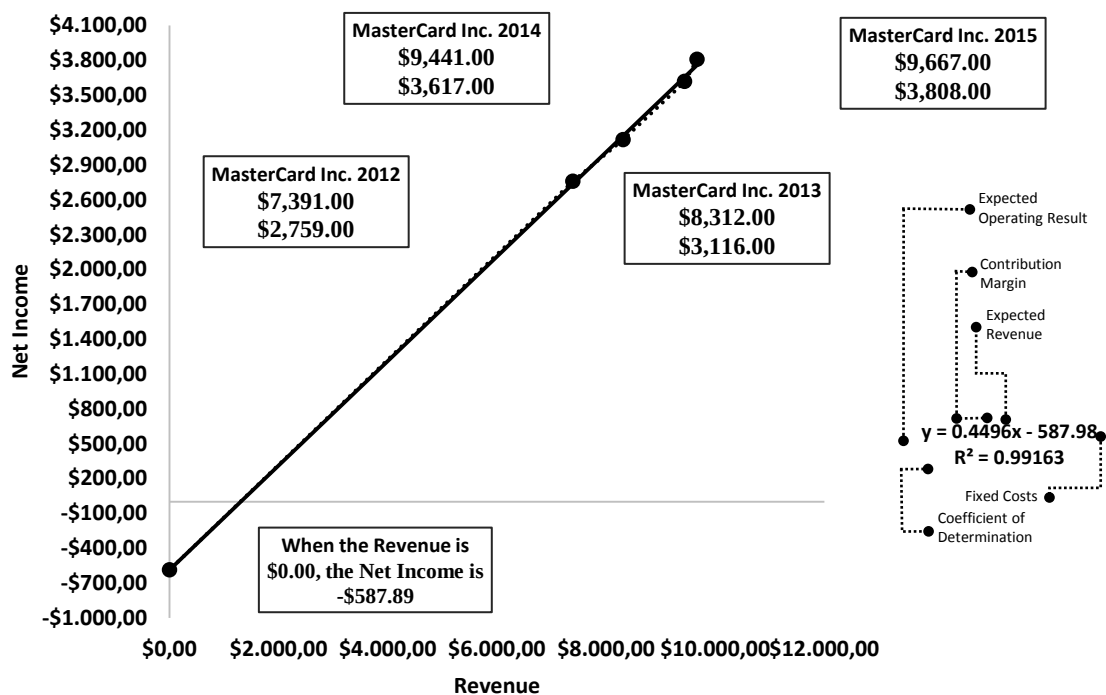


Figure 20 Fixed Costs - MasterCard Inc.

Break-Even Analysis, Operating Income Version - MasterCard Inc.

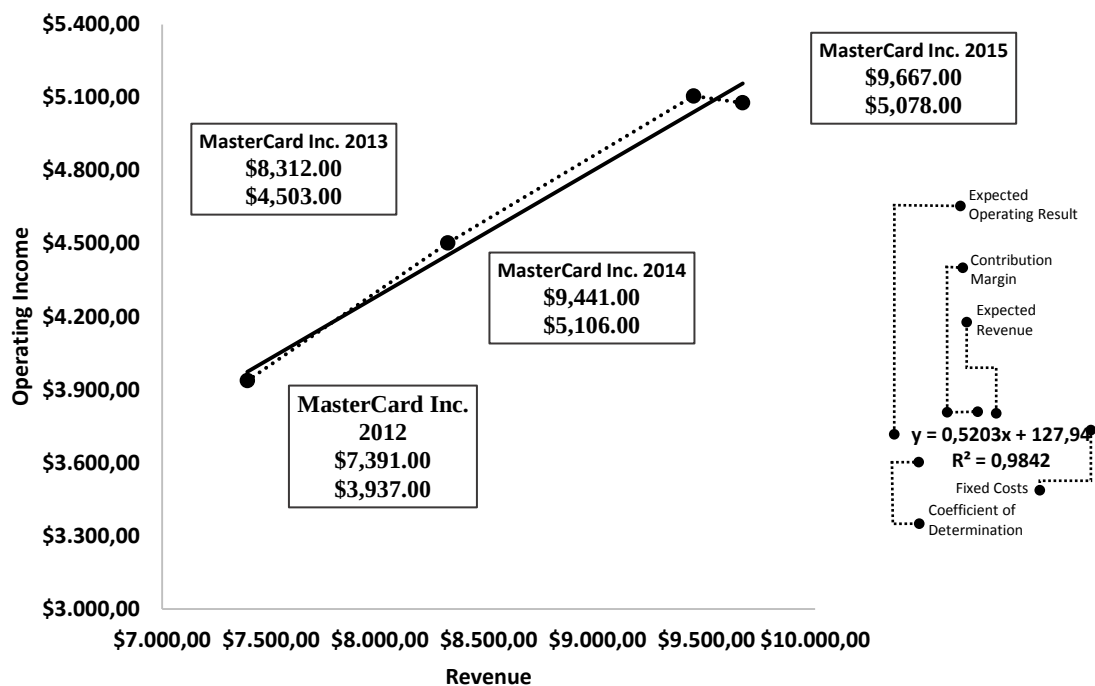


Figure 21 Break-Even Analysis, Operating Income Version - MasterCard Inc.

Fixed Operating Costs - MasterCard Inc.

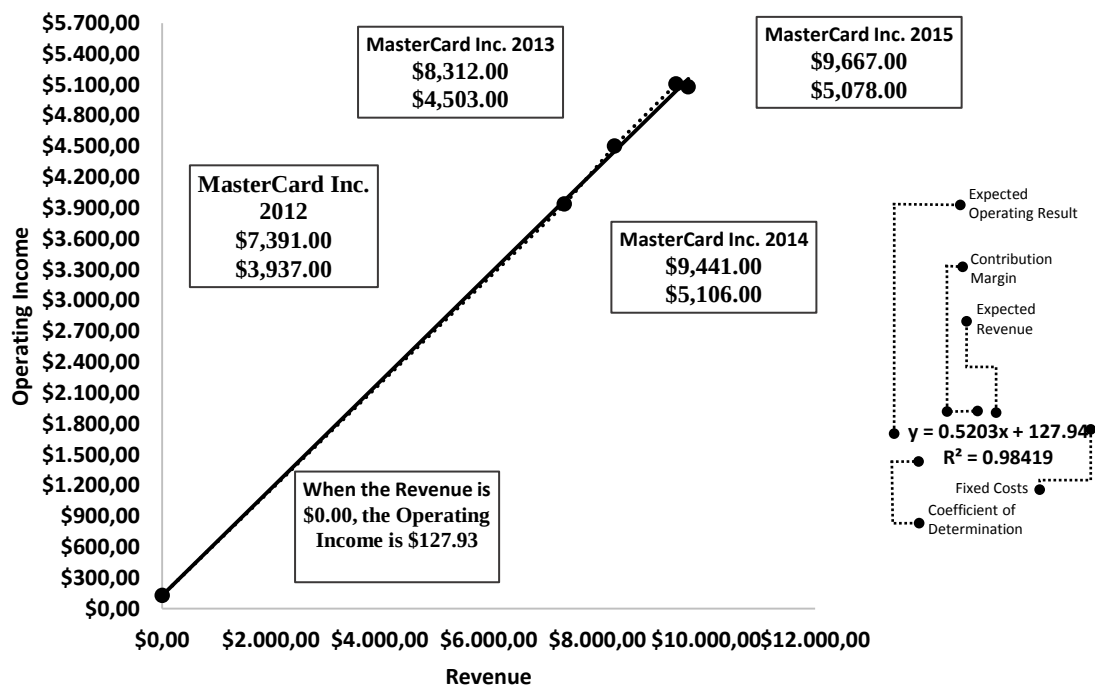


Figure 22 Fixed Operating Costs - MasterCard Inc.

The last observed company in our sample is the American Express Company. As in the previous examples, a net income version break-even analysis was carried out first, followed by an operating income version. *Figure 23* shows the relationship between the revenue and net income of this company during the period 2012 to 2015. The revenue and net income rose between 2012 and 2014, after which a sharp decline was seen for both values. The estimated fixed costs were \$16,088.00 million (*Figure 24*) in 2015, while the contribution margin was 0.64. The estimated break-even indicates that the American Express Company needs to generate revenue of \$26,588.70 million in order to achieve a neutral net income.

The operating income version break-even analysis of the American Express Company gives the following results. After a constant rise, a sharp decline was also seen in its operating income (*Figure 25*). The company had fixed operating costs amounting to \$30,825.00 (*Figure 26*) in 2015, whereas the contribution margin was 1.11 (much higher than the estimated one according to the net income version). Finally, the conclusion is that the American Express Company needs to generate revenue of \$27,730.16 million in order to achieve a neutral operating income.

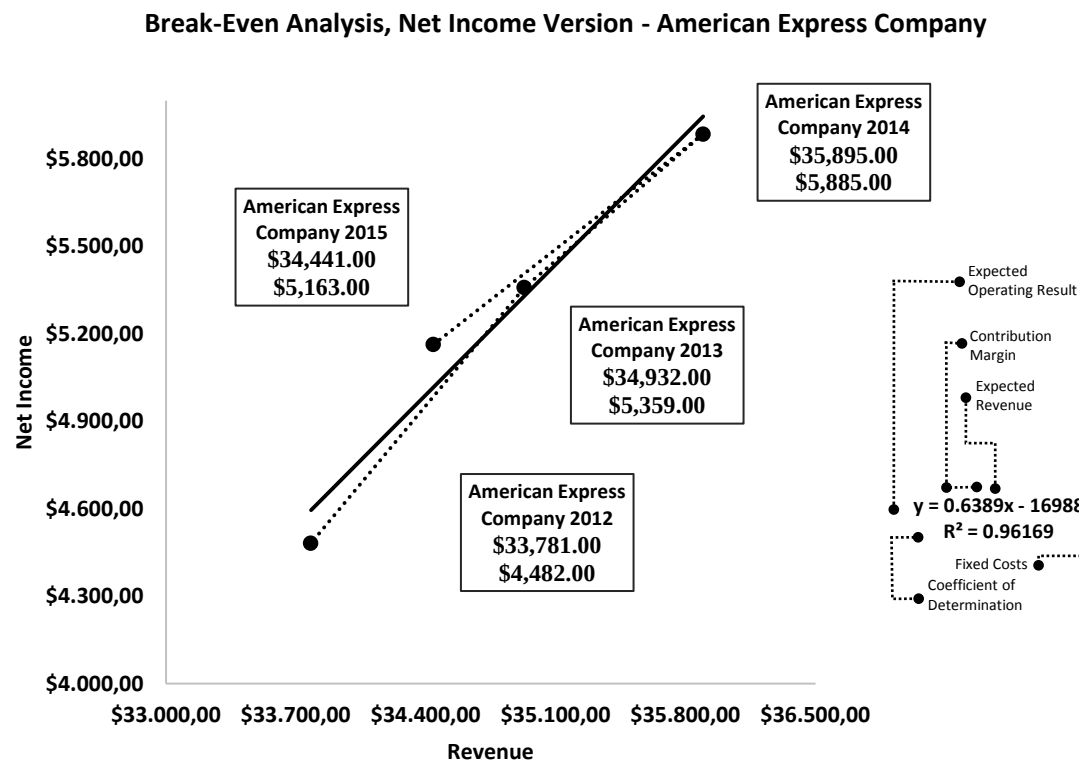


Figure 23 Break-Even Analysis, Net Income Version - American Express Company

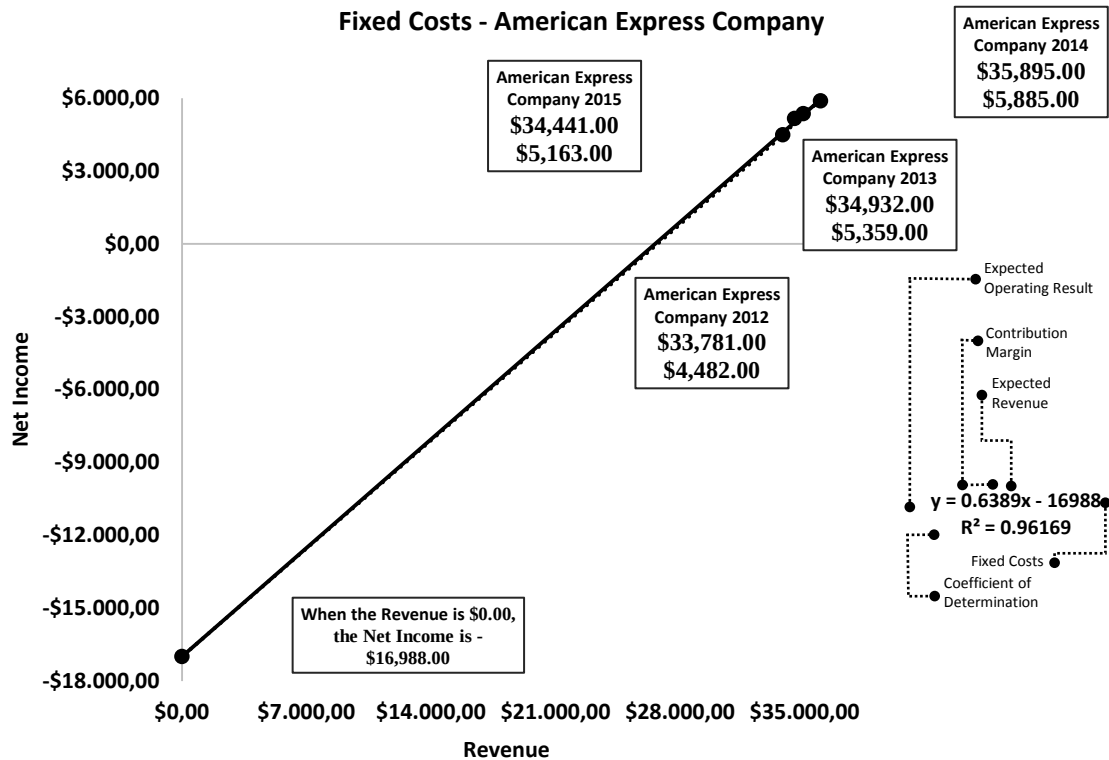


Figure 24 Fixed Costs - American Express Company

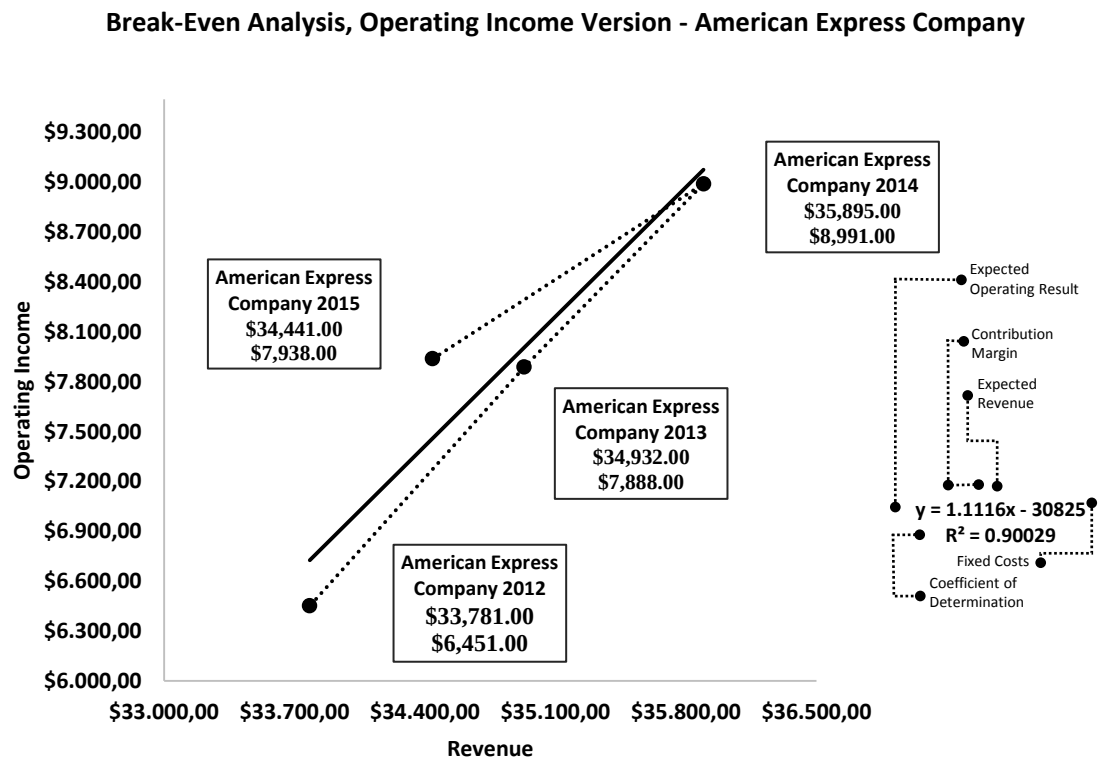


Figure 25 Break-Even Analysis, Operating Income Version - American Express Company

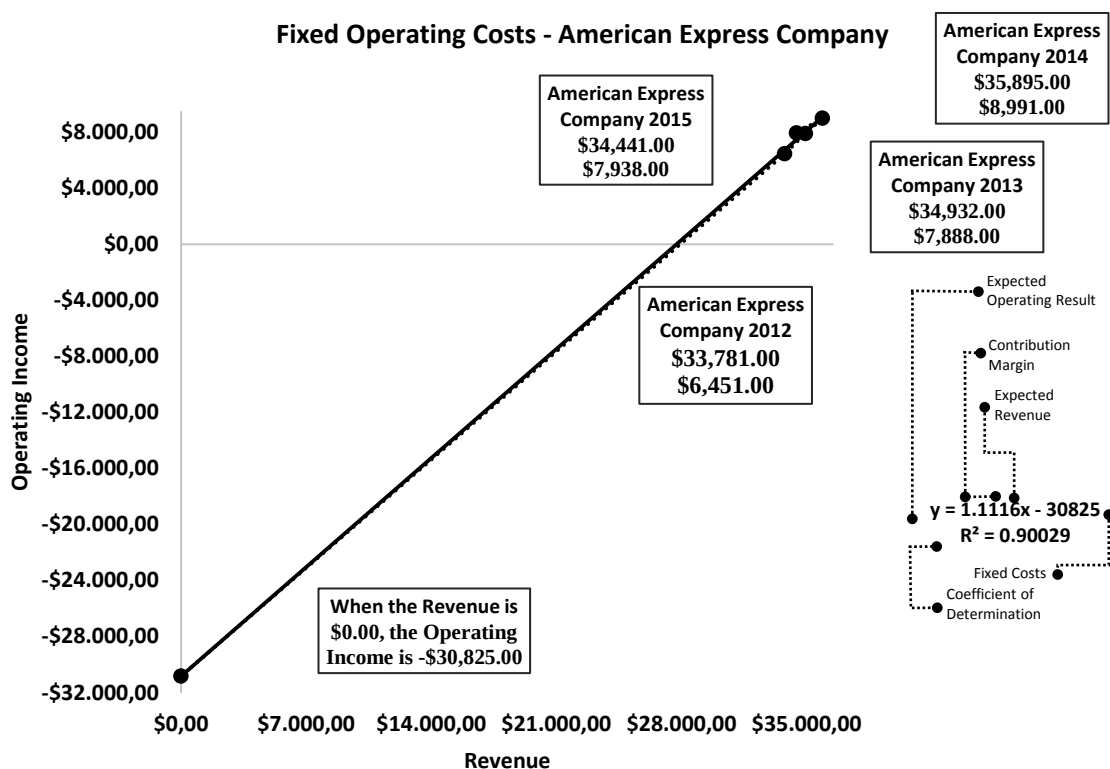


Figure 26 Fixed Operating Costs - American Express Company

Figure 27 shows the short-term financial investments as a percentage of the total assets for the sample companies. As can be seen, the American Express Company had the highest percentage of short-term investments relative to its total assets in 2015. The average value of this indicator during the same year was 10.08%; the median was 11.61%.

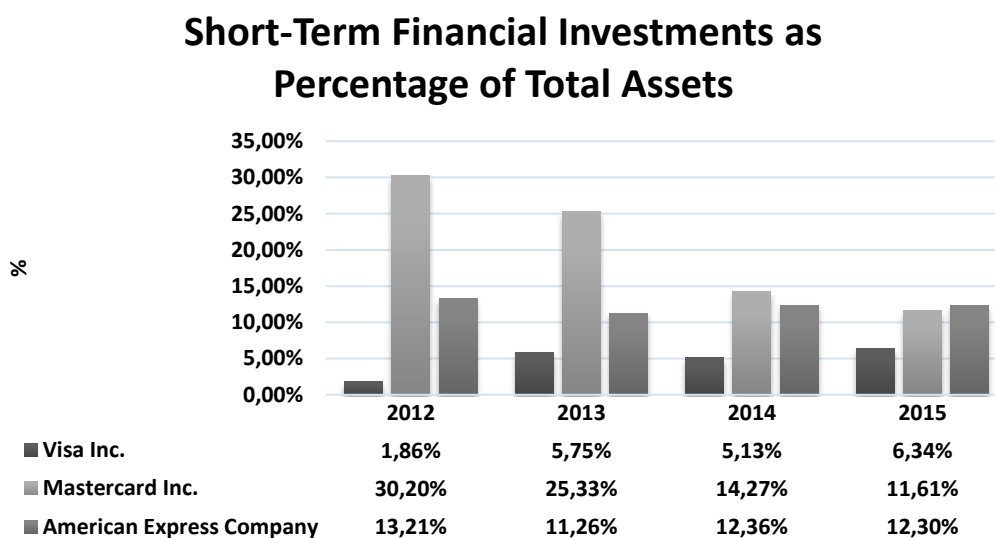


Figure 27 Short-Term Financial Investments as a Percentage of Total Assets

As can be seen in *Figure 28*, the American Express Company had the highest percentage of long-term investments relative to the value of its total assets in 2015. The average value of this indicator in the same year was 8.08%, while the median was 8.60%.

Long-Term Financial Investments as Percentage of Total Assets

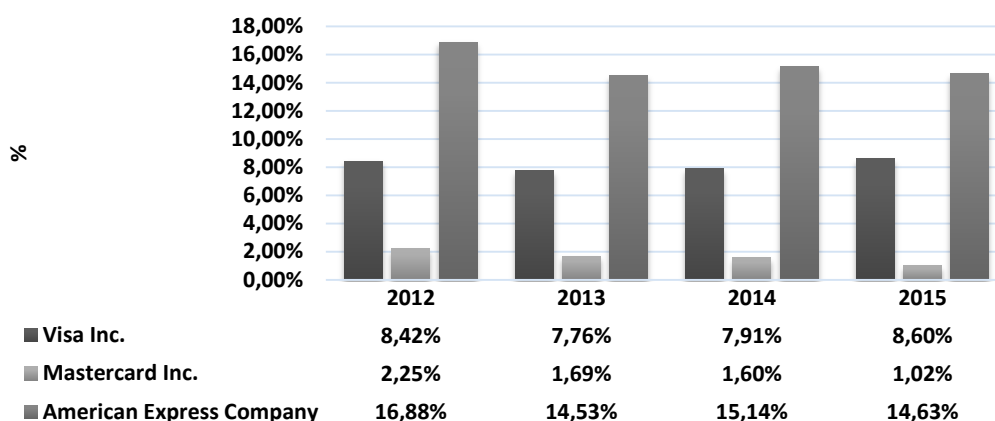


Figure 28 Long-Term Financial Investments as a Percentage of Total Assets

Figure 29 shows the selling, general, and administrative expenses (SG&A) as a percentage of the total operating expenses for each of the observed companies. Significantly, MasterCard Inc. had quite high values for this indicator from 2012 onwards. This means that (i) promoting, selling, and delivering products and services, and (ii) managing the overall company make up the highest value of the total operating expenses. The average value of this indicator was 74.13% in 2015, whereas the median was 19.61%. No company in our sample invested in research and development.

SG&A as Percentage of Total Operating Expense

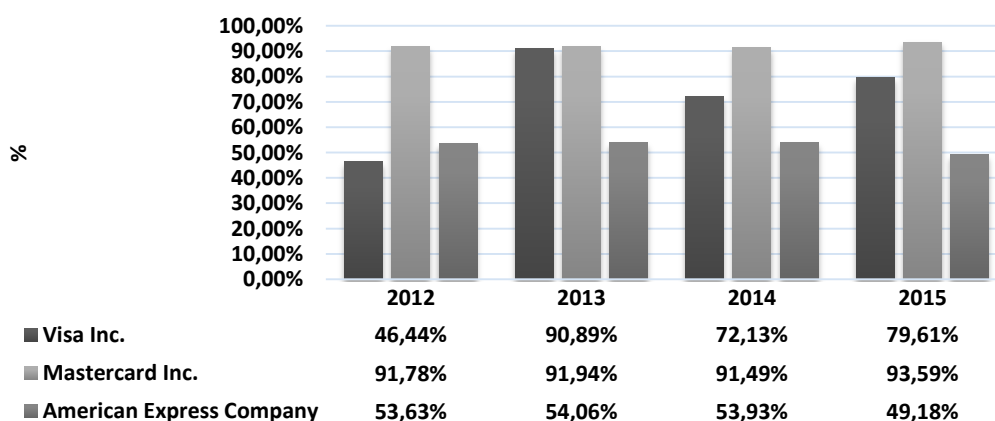


Figure 29 Selling, General, and Administrative Expenses (SG&A) as a Percentage of Total Operating Expenses

Depreciation and amortization as a percentage of the total operating expenses can be seen in *Figure 30*. The average value was 7.39% in 2015; the median was 7.98% in the same year.

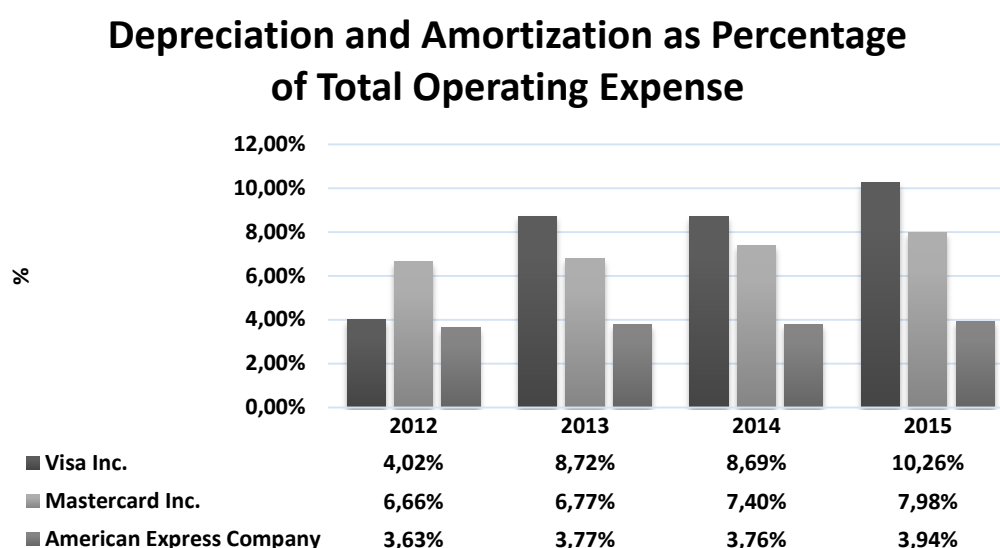


Figure 30 Depreciation and Amortization as a Percentage of Total Operating Expense

For the purposes of credit risk assessment, we first observe the companies' X ratios for the period 2012 to 2015, as shown in *Table 1*.

Table 1 T-Ratios

Year	Visa Inc				Mastercard Inc				American Express Company			
	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015
X1	0.04	0.04	0.04	0.03	0.19	0.09	-0.02	-0.06	0.29	0.31	0.3	0.37
X2	0.2	0.22	0.24	0.3	0.59	0.71	0.86	1	0.05	0.06	0.06	0.06
X3	0.05	0.2	0.2	0.23	0.32	0.32	0.33	0.31	0.04	0.05	0.06	0.05
X4	2.23	2.96	2.46	3.13	1.25	1.11	0.8	0.59	0.14	0.15	0.15	0.15
X5	0.26	0.33	0.33	0.35	0.59	0.58	0.62	0.59	0.22	0.23	0.23	0.21

Based on the z score results from *Figure 31*, the American Express Company is considered a high default risk firm ("distress" zone) during the entire investigated period. In order to avoid the so-called *distress* zone, the company should increase some of the ratios in *Table 1*. Since the z score values for both Visa Inc. and MasterCard Inc. are between 1.23 and 2.9 during the same period, these companies are considered indeterminate default risk firms ("gray" zone). The average value of this indicator was 2.01 in 2015; the median was 2.61.

Z Score for Private Firms

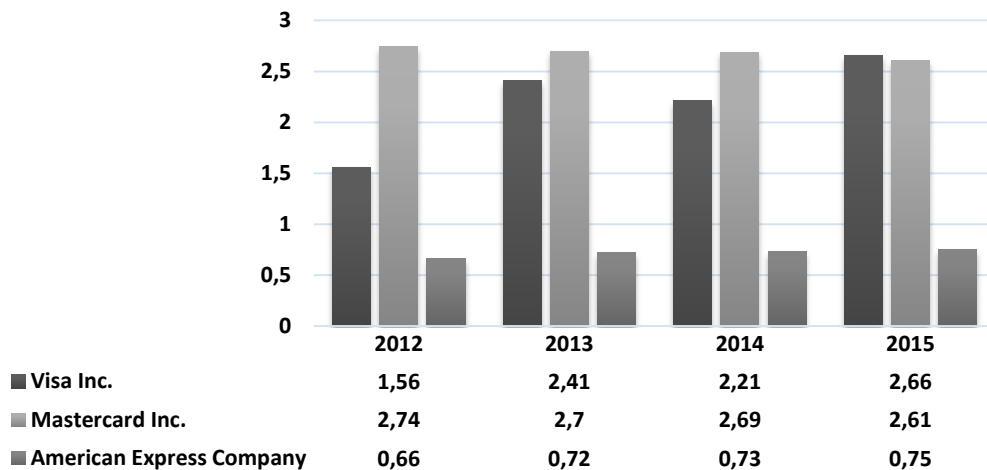


Figure 31 Z Score for Private Firms

As was mentioned in the methodology section, instead of using the previously discussed zones discrimination classification, the score conversion into implied bankruptcy quasi-probabilities might give more useful results. Therefore, we observe the quasi-probability values of corporate bankruptcy (*Figure 32*); these values show an implicated bankruptcy prediction within a two-year period. A large disparity can be observed between the American Express Company and comparable group companies. For example, according to this model the implicated bankruptcy prediction within a two-year period was 32.15% for the American Express Company in 2015, whereas Visa Inc. and MasterCard Inc. had much lower probabilities (6.54% and 6.84%, respectively). The indicator's average value was 15.18% in 2015, while the median was 6.84%.

Z Score Implied Bankruptcy Probability for Private Firms

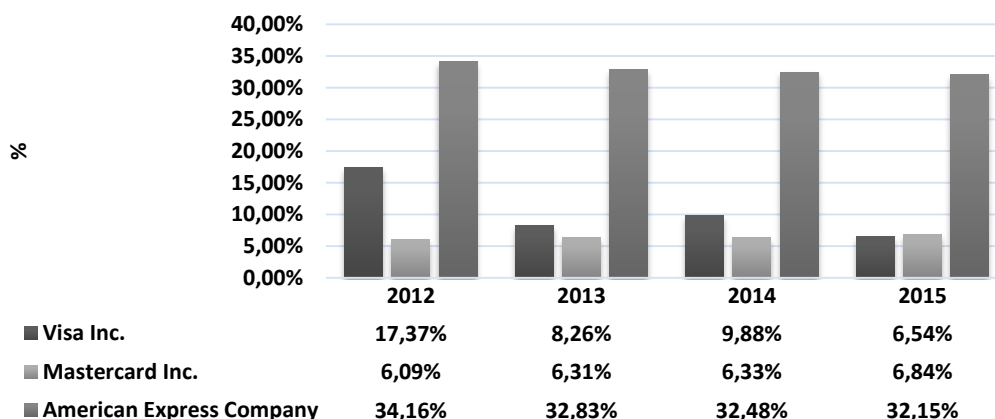


Figure 32 Z Score Implied Bankruptcy Probability for Private Firms

Figure 33 shows the amount of cash available to investors¹⁴ after a company pays the costs of doing business, invests in short-term assets like an inventory, and invests in long-

term assets such as property, factories, and equipment, whereas *Figure 34* shows a measure of how much cash can be paid to the equity shareholders of the observed companies after all the expenses, reinvestments, and debts have been paid.

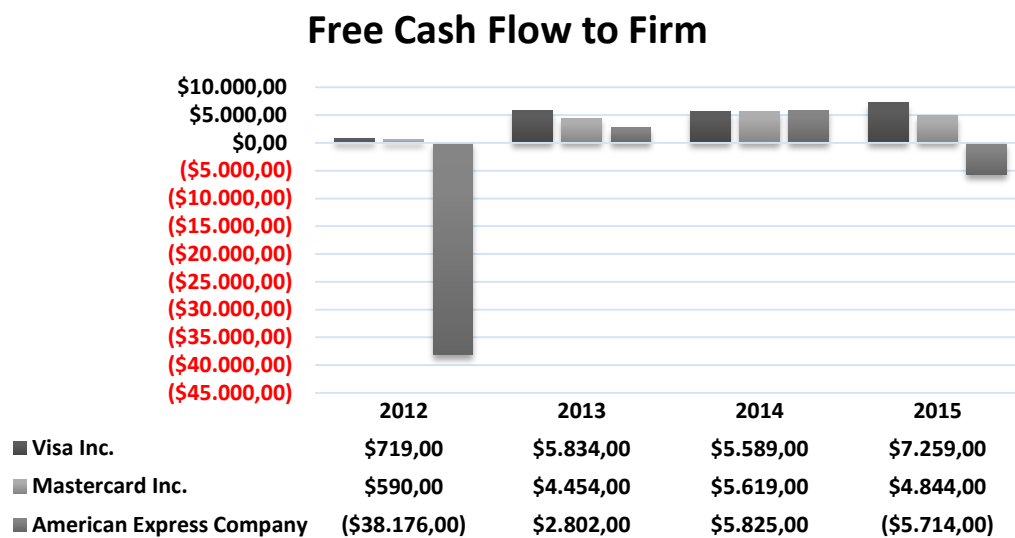


Figure 33 Free Cash Flow to Firm

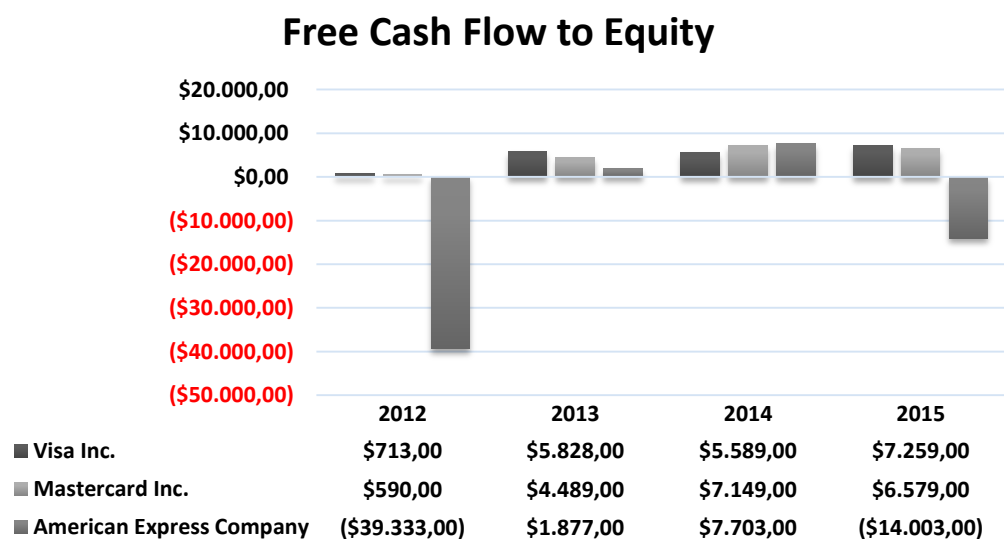


Figure 34 Free Cash Flow to Equity

Considering the business sector with a higher than expected net margin, a lower assets turnover ratio, and less leverage, Visa Inc. achieved a return on equity rate of 21.21% in 2015 (*Figure 35*).

Visa Inc.	Net Margin	45.59%		Return on Equity	21.21%
	Assets Turnover	0.35			
	Leverage Ratio	1.32			
The Group of Comparable Companies	Net Margin	27.19%		Return on Equity	44.03%
	Assets Turnover	0.40			
	Leverage Ratio	4.01			
Financial Sector	Net Margin	13.83%		Return on Equity	8.62%
	Assets Turnover	0.37			
	Leverage Ratio	7.38			

Figure 35 Comparative DuPont Analysis - Visa Inc.

Despite the fact that MasterCard Inc. had less leverage than the average (considering both the comparable group companies and the business sector), with an above-average net margin and a higher than average assets turnover ratio, the company generated a return on equity of 63.17% in 2015 (*Figure 36*).

Mastercard Inc.	Net Margin	39.39%		Return on Equity	63.17%
	Assets Turnover	0.59			
	Leverage Ratio	2.70			
The Group of Comparable Companies	Net Margin	30.29%		Return on Equity	39.09%
	Assets Turnover	0.28			
	Leverage Ratio	4.56			
Financial Sector	Net Margin	13.83%		Return on Equity	8.62%
	Assets Turnover	0.37			
	Leverage Ratio	7.38			

Figure 36 Comparative DuPont Analysis - MasterCard Inc.

The American Express Company's smaller assets turnover ratio (considering the business sector) and net margin in 2015 were offset by an above-average high leverage. Consequently, the company achieved a relatively good return on equity of 24.97% (*Figure 37*).

American Express Company	Net Margin	14.99%	➡	Return on Equity	24.97%
	Assets Turnover	0.21			
	Leverage Ratio	7.80			
The Group of Comparable Companies	Net Margin	42.49%	➡	Return on Equity	40.41%
	Assets Turnover	0.47			
	Leverage Ratio	2.01			
Financial Sector	Net Margin	13.83%	➡	Return on Equity	8.62%
	Assets Turnover	0.37			
	Leverage Ratio	7.38			

Figure 37 Comparative DuPont Analysis - American Express Company

As can be seen in *Figure 38*, the American Express Company had the lowest interest coverage ratio relative to other comparable companies in 2015. Nevertheless, as was explained in the methodology section, as the company is a mature one with stable historical cash flow, interest coverage like this is completely acceptable. The average value of this indicator was 77.42 in 2015, while the median was 111.90.

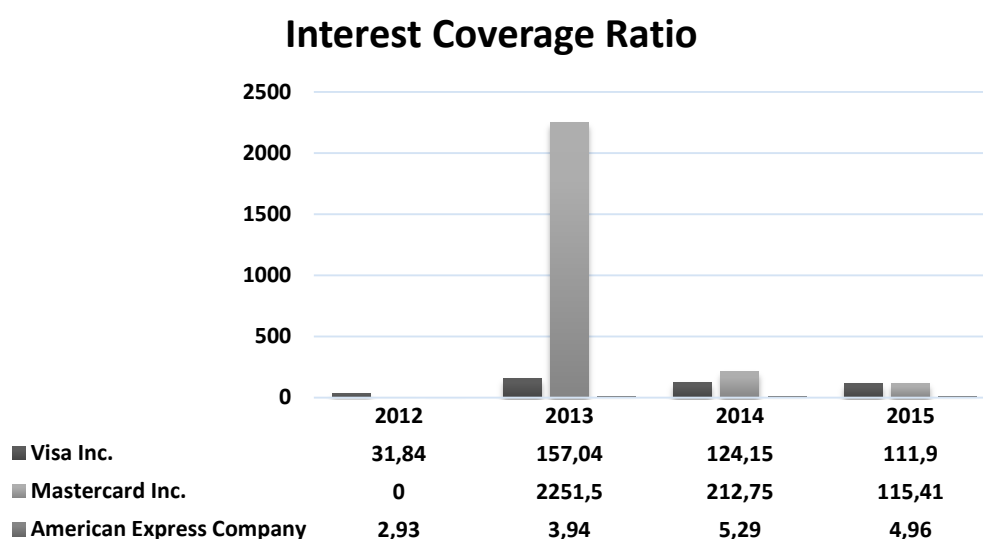


Figure 38 Interest Coverage Ratio

All the observed companies have been actively paying dividends in recent years, while American Express Company had the highest percentage of the amount paid out in 2015 (*Figure 39*).

Dividend Payout Ratio

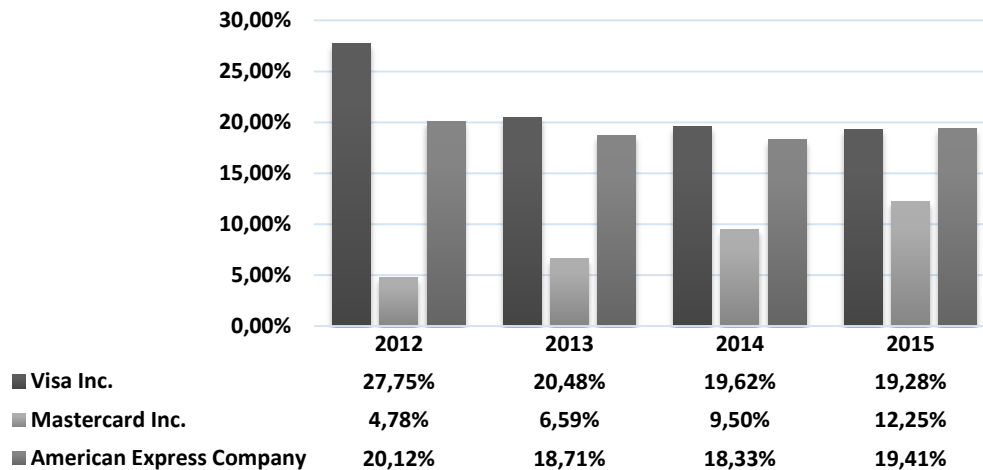


Figure 39 Dividend Payout Ratio

Among the sample companies, MasterCard Inc. had the highest sustainable growth rate throughout this period (Figure 40). For instance, it seems that the maximum annual rate at which MasterCard Inc. was expected to grow without increasing its financial leverage was 124.39% in 2015. The average value of this indicator was 56.75% in 2015, whereas the median was 25.20%.

Sustainable Growth Rate

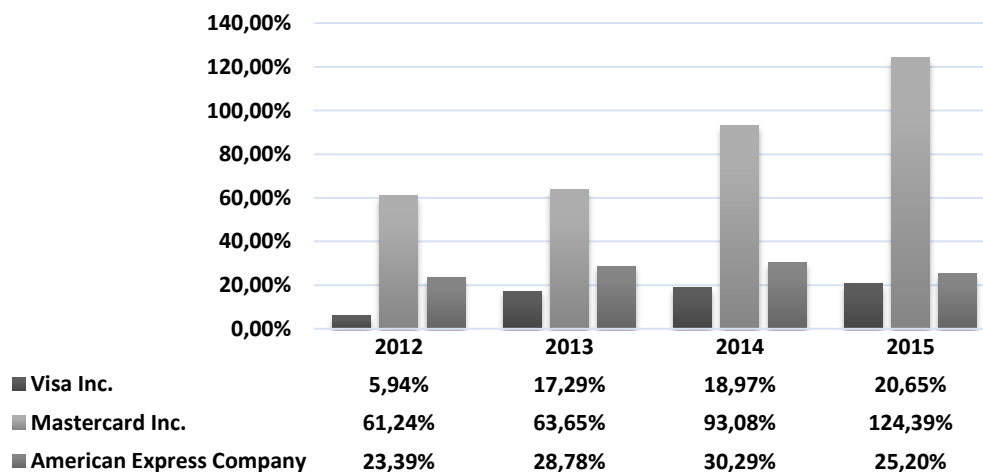


Figure 40 Sustainable Growth Rate

The following figure (no. 41) shows the nominal corporate tax rates in the US during the period 2005 to 2016. According to the Internal Revenue Service, a Treasury bureau in the US¹⁵, the nominal corporate tax rate in the US was 39% in 2015.

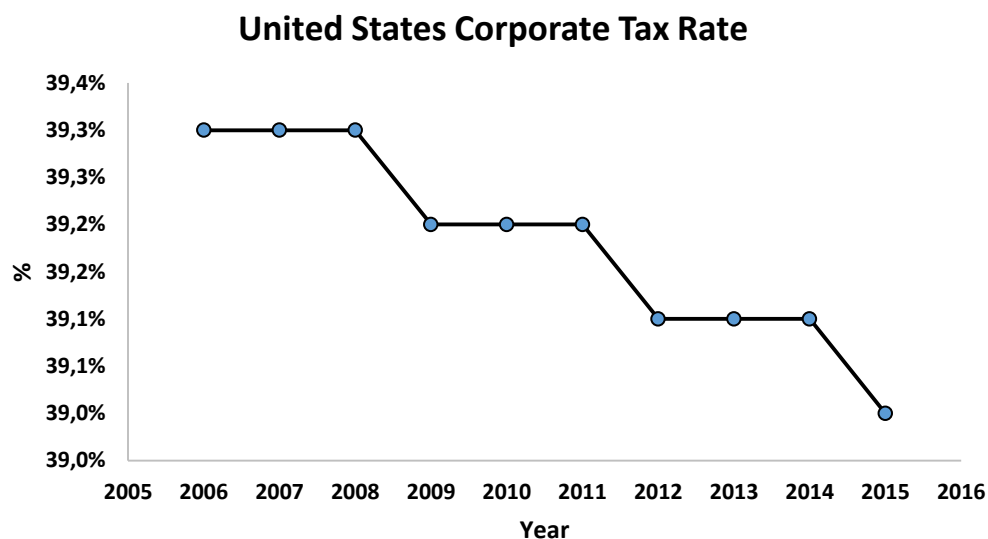


Figure 41 United States Corporate Tax Rate

Source: This figure was created using the data provided by Trading Economics (2016)

However, as can be seen in *Figure 42*, none of the investigated companies pay the nominal tax rate. The highest rate was paid by the American Express Company in 2015 (20.16%), while Visa Inc. and MasterCard Inc. paid only 0.90% and 0.89%, respectively.

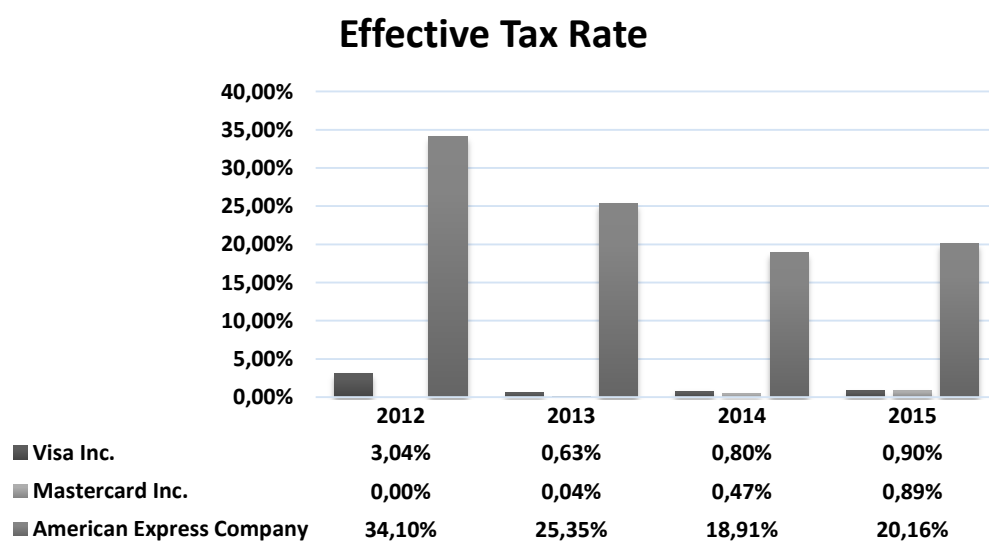


Figure 42 Effective Tax Rate

Figure 43 shows the age of facility ratio.

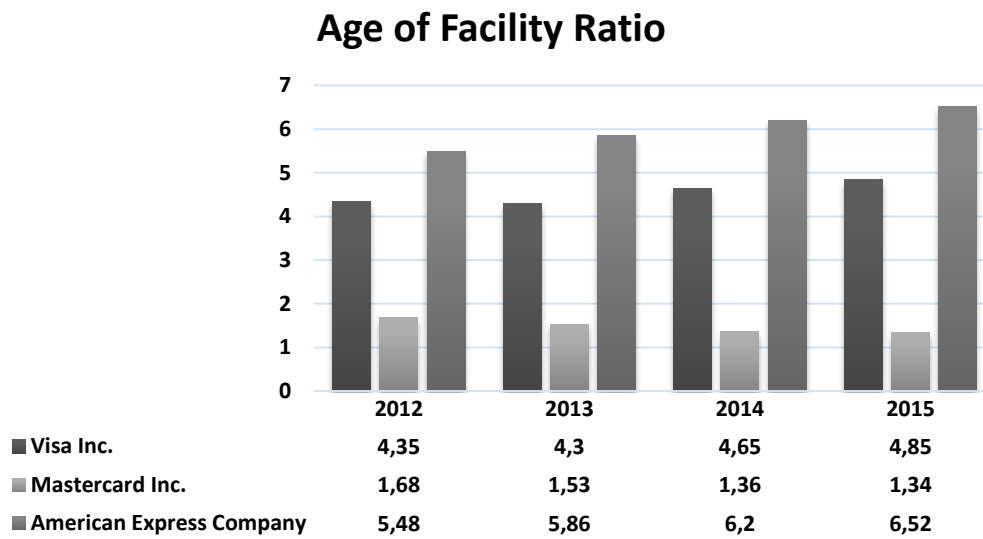


Figure 43 Age of Facility Ratio

Figures 44,45, and 46 show the SWOT analysis results for the sample companies.



Figure 44 SWOT Analysis - Visa Inc.



Figure 45 SWOT Analysis - MasterCard Inc.



Figure 46 SWOT Analysis - American Express Company

Regardless of the strong desire to offer different products to their consumers, payment card networks tend to offer more or less the same things. Nevertheless, there is cut-throat competition between the industry leaders. The consumers' holding cards of many different networks have raised a significant issue in the market. Consequently, the main tactics to retain both new and current consumers consist of loyalty programs and rebates. One of the newest offered features is the so-called contactless payment, which provides quick and safe everyday purchases. PayPal, founded in 1998, as well as more recently established competitors such as Google Wallet, are undoubtedly a serious threat to traditional networks.

However, those traditional networks are high-profile companies with an overwhelming number of loyal consumers. Apart from loyalty, consumer security is probably the main reason for not trying new brands and alternative ways of paying. Moreover, the capital intensity needed for setting up a payment network is a significant barrier for new entrants.

There have been many attempts to replace payment cards with different proprietary cards, but none have been successful. On the other hand, the use of cash might also be a substitute, but as noted in the literature review of this paper, many studies have proven that there is little chance of replacing electric payment methods with cash again.

As is known in basic economics, when there are only a few suppliers, buyers have low bargaining power over them, and vice versa. Consequently, despite the possibility of holding several cards issued by different networks, and of taking advantage of various promotions and rebates, there are only a few networks to choose from, and hence buyer power is not so great.

As was shown in the companies' SWOT analysis in this paper, there is a lot of exposure to risks and frauds in payment card networks. These risks arise from: 1) human capital and 2) information technology. IT companies, however, that provide services for the analyzed networks have a broad customer base, and hence a lot of power over them.

As a result of Porter's five forces analysis, we conclude that (i) the industry rivalry is at a high level, (ii) the threat of new entrants is low, (iii) the threat of substitutes is low, (iv) the bargaining power of buyers is moderate, and (v) the bargaining power of suppliers is moderate.

In the following part of this paper, we provide the corporate valuation analyses, based on our sample companies.

The current market price of Visa Inc. is \$79.68 per share, while we estimate a price of \$88.86. On the other hand, the market capitalization of this company is \$172 billion, whereas our projection accounts for \$192 billion. The Assessment Fees refer to 44.8% of our stock price estimation for Visa Inc., whereas the International Fees constitute 26.3% of this price. The remaining 28.9% is accounted for by the Transaction Fees and Service Fees (26.3% and 2.6%, respectively).

As the Assessment Revenue accounts for approximately half of our estimated stock price, it is observed first. The key drivers for this revenue are in this case: (i) Visa's Assessment Fee Percentage, (ii) the Gross Dollar Volume per Transaction, (iii) the Number of Transactions per Visa Card, (iv) the Total Number of Cards in Circulation, and (v) Rebate as a Percentage of Total Revenue.

Generally speaking, as explained in the official report maintained by Trefis (2016c), Visa's Assessment Fee (%) represents the fee charged by this payment card network to payment card companies (banks) based on the total payment volume of business generated for these companies through Visa branded products. As can be seen in *Figure 47*, we expect Visa's Assessment Fee to be around 0.15% over the valuation period due to global business prosperity after the recent devastating financial crisis in 2008. However, we do not see any further rise in fees, as Senator Dick Durbin's amendment was passed in the US Senate with a 64-33 vote in 2010. Interestingly, the senator issued the following statement about his debit card swipe fee amendment (Durbin, 2010):

“Wall Street reform is really about two things: holding the big banks accountable for how they operate and empowering consumers to make good financial choices. Passage of this amendment is a win for the public on both fronts.

Passage of this measure gives small businesses and their customers a real chance in the fight against the outrageously high ‘swipe fees’ charged by Visa and MasterCard. It will prevent the giant credit card companies from using anti-competitive practices, allow merchants to offer discounts to their customers and restore common sense and fairness to this broken system.

By requiring debit card fees to be reasonable, and by cleaning up Visa’s and MasterCard’s worst abuses, small businesses and their customers will be able to keep more of their own money. Making sure small businesses can grow and prosper is vital to putting our country back on solid economic footing.”

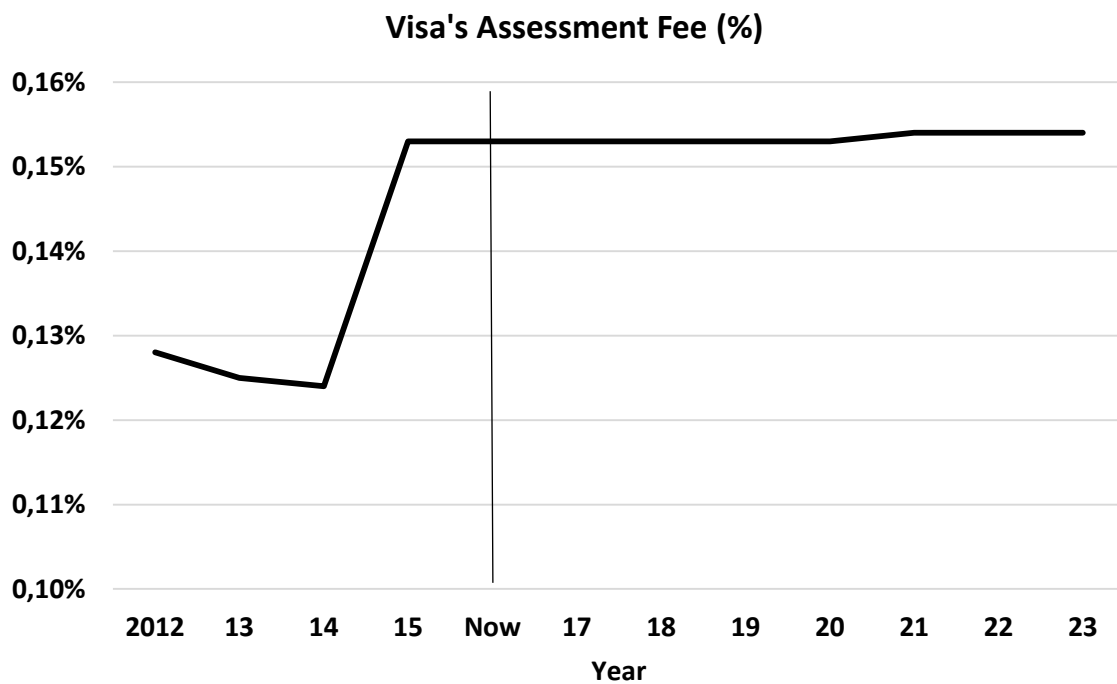


Figure 47 Visa's Assessment Fee (%) - Visa Inc.

Next, we estimate the total number of transactions carried out per Visa card, calculated by the following equation (no. 68):

Equation 68 Total Number of Transactions

$$\frac{\text{Total Number of Transactions in a given year}}{\text{Total Number of Visa Cards in Circulation in a given year}}$$

As shown in *Figure 48*, the total number of transactions carried out per Visa card reached 28.6 in 2016 after bottoming out in 2012. While Trefis (2016c) expects a marginal decline in the number of transactions per Visa card, we believe this number will rise continuously over the forecast period due to several reasons, the most important of which is allowing US payment card networks to operate in China. As noted in an article entitled “China opens door for Visa and MasterCard to challenge UnionPay” that appeared in the Financial Times (2015) in late October 2014, China’s cabinet announced¹⁶ it would allow foreign companies to access the market. The government followed up in April the following

year with rules that took effect on June 1. We see a considerable opportunity for Visa Inc. here, as according to Reuters (2016), China's card market is projected to become the world's biggest by 2020. However, it is important to point out that this might also be a potential downside to our estimated stock price due to the fact that Visa's success on the Chinese market is still in question.

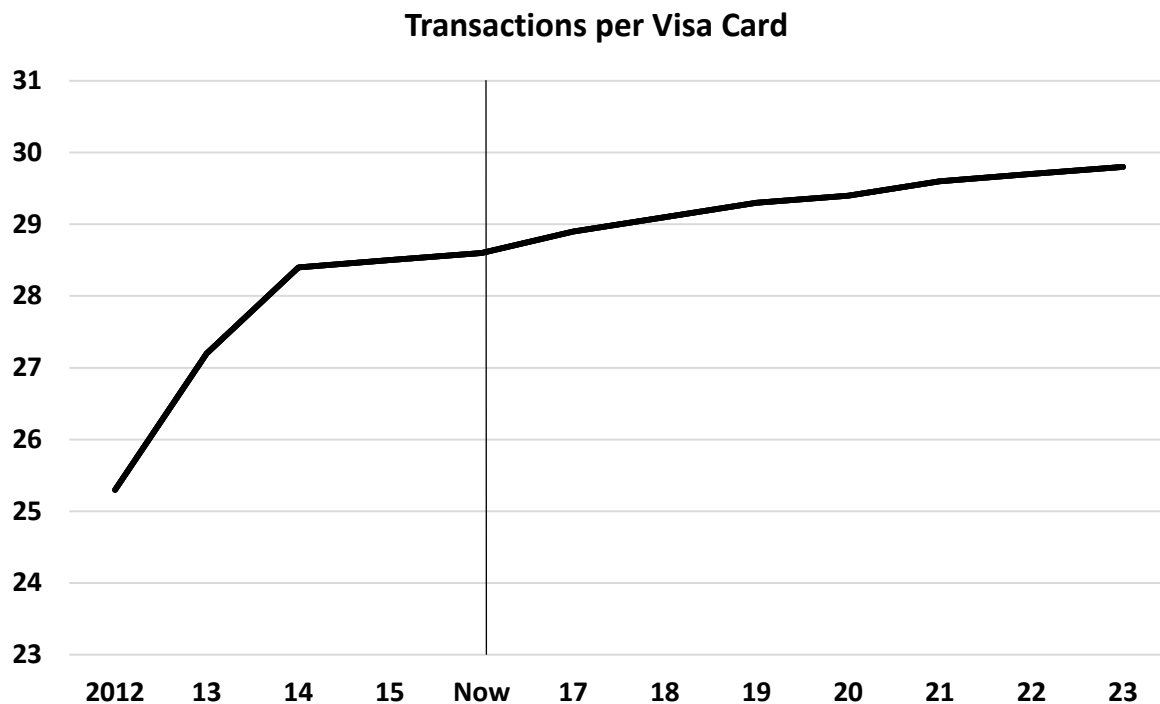


Figure 48 Transactions per Visa Card Visa - Inc.

Figure 49 shows the gross dollar volume (GDV) per transaction. After a sharp decline during the subprime crisis, the GDV per transaction started to grow. We forecast a steady increase in the GDV per transaction over the valuation period, mainly due to the improved global economic situation after the crisis that eventually increased consumer spending.

On the other hand, the so-called E-commerce and M-commerce revolutions have indeed created lucrative opportunities for Visa Inc. and all the other payment card networks. For instance, as indicated in Visa's (2015) annual report, because of this huge opportunity, many - be they specific retailers, mobile device manufacturers, mobile network operators, social networks, search engines, or others - are working to integrate payments to further their own business objectives. As a consequence, these actions will definitely boost the average user's spending, and hence the GDV per transaction.

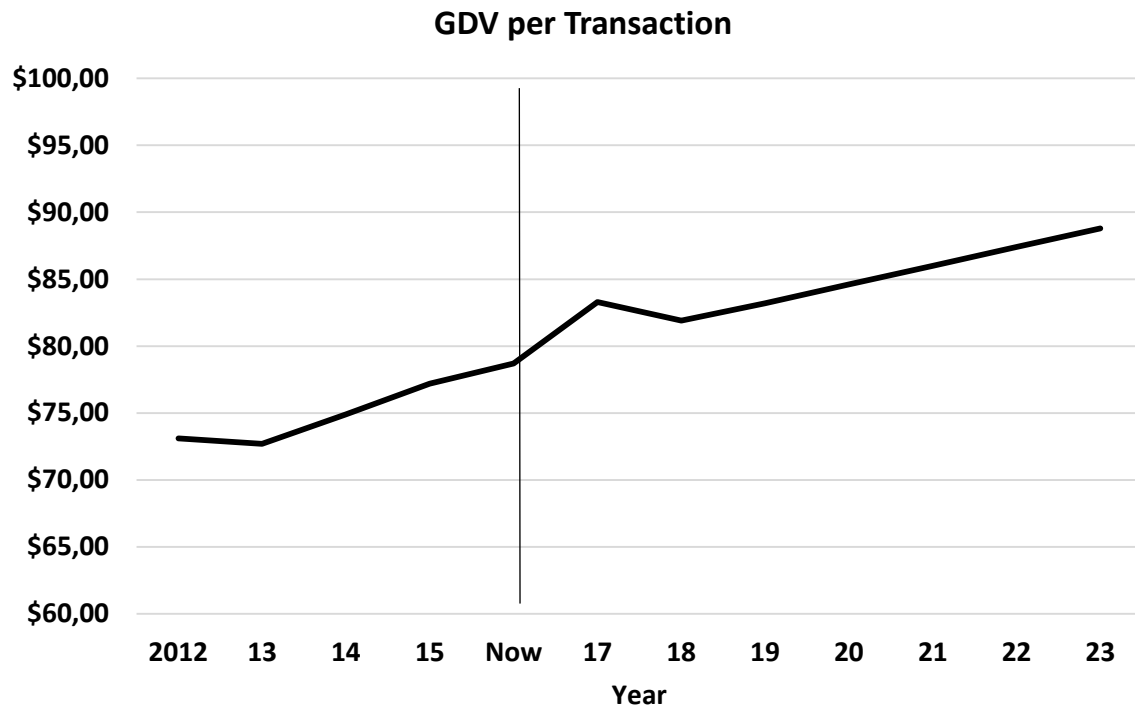


Figure 49 Gross Dollar Volume (GDV) per Transaction - Visa Inc.

As previously mentioned, the next important driver for Visa's Assessment Fees is the total number of Visa cards in circulation. We expect the previously established growth to continue over the forecast period (*Figure 50*). Visa Inc. is, as indicated in the SWOT analysis, the market leader with the largest market share out of all the payment card networks. The only company that has more cards in circulation is, according to Trefis (2016c), China UnionPay; nevertheless, most of its cards can only be used in China, which puts Visa at a serious advantage over this company. Moreover, a cashless society, whose implications have been observed by many such as Costa Storti and De Grauwe (2001), Bergsten (1966), Downey (1996), Worthington (1995), and Fox (1980), also creates a significant opportunity for growth.

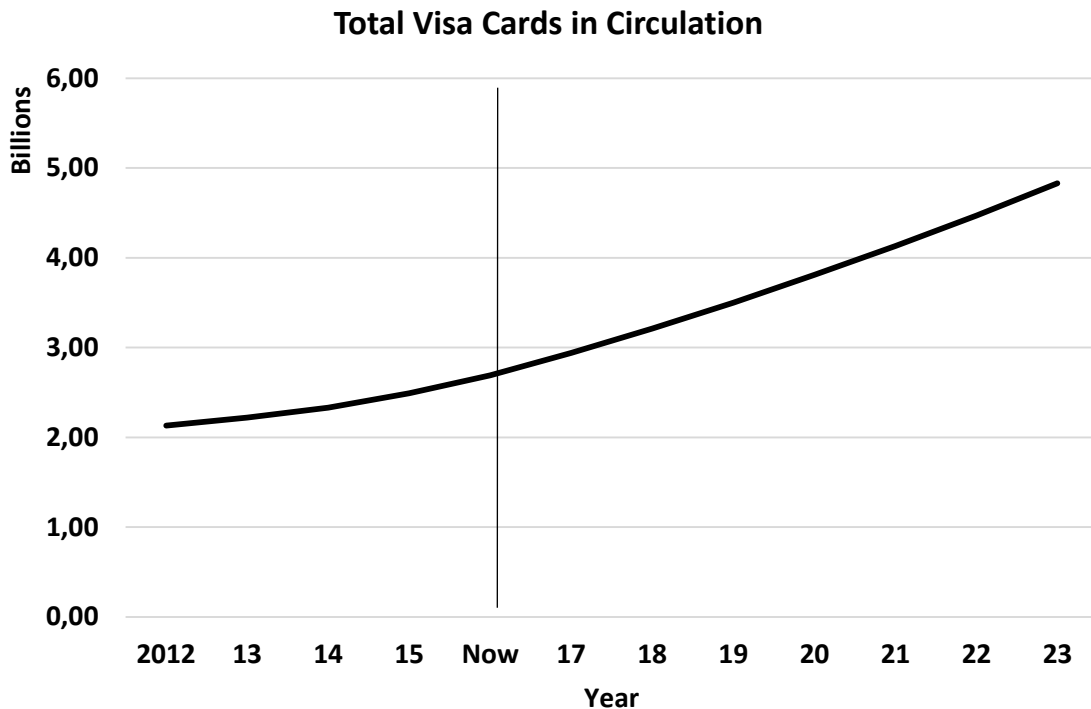


Figure 50 Total Visa Cards in Circulation - Visa Inc.

As we previously indicated in the SWOT analysis, the highly competitive environment, which includes a price war between the payment card networks, is one of the biggest threats to Visa Inc. On the other hand, as was revealed in Porter's five forces analysis, regardless of their strong desire to offer different products to their consumers, payment card networks tend to offer more or less the same things. In order to attract new customers and retain current ones, these companies use tactics such as loyalty programs and rebates.

Figure 51 shows rebates as a percentage of the total revenue of Visa Inc. As can be seen, we forecast these incentives offered to consumers to remain at their current level, around 17%, during the valuation period. Due to the previously mentioned tactics used to retain consumers, we see no decline in this value.

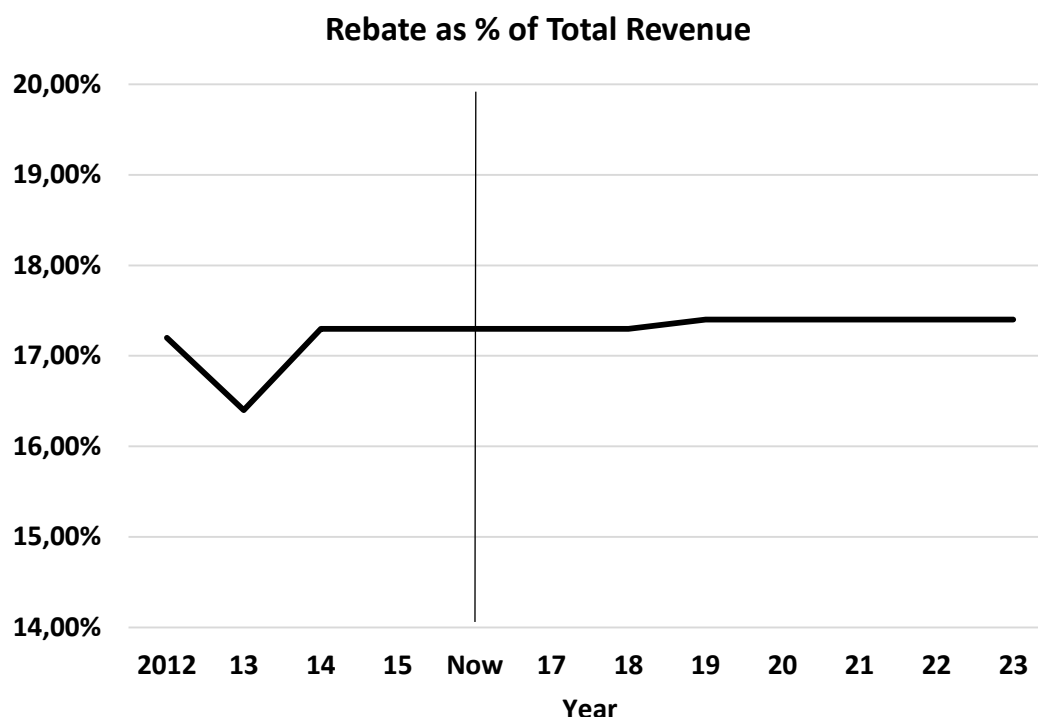


Figure 51 Rebates % of Total Revenue - Visa Inc.

The International Fees constitute 26.3% of our estimated Visa stock price, and are analyzed next in this paper. The following four key drivers can be observed: (i) Visa's International Transaction Fee Percentage; (ii) the International Gross Dollar Volume (GDV) per Card; (iii) the Total Visa Cards in Circulation; and (iv) Rebates as a Percentage of Total Revenue. As can be seen, the last two drivers, the total number of Visa credit and debit cards in circulation, and rebates as a percentage of total revenue, were already analyzed during the assessment fees observation. Therefore, we are mainly focusing on the first two drivers, Visa's international transaction fee percentage and the international GDV per Visa card.

As noted by Trefis (2016c), an International Transaction Fee consists of two components: Currency Conversion and a Cross-Border Fee. These two components are charged by Visa Inc. to the amount of 0.8% and 0.2% of the transaction value, respectively. We forecast a marginal decline over the valuation period, which is primarily due to cut-throat competition between the industry leaders in the payment card industry (*Figure 52*).

Another important reason for not increasing this fee is related to regulatory issues. As the Financial Times (2013) reported, Visa Europe Ltd. pledged to cut international fees by 40 to 60% within the European Economic Area. During that period, Visa Europe Ltd. was a bank-owned group that was separate from its listed US counterpart. Nevertheless, even after Visa Inc. agreed to acquire Visa Europe Ltd. in a deal valued at as much as \$23.4 billion to unify the brand globally after eight years as separate companies (Bloomberg, 2015), the company still faces more or less the same pressures within the European Union.

However, the main reason the international transaction fees are expected to remain at their current level is related to the so-called economies of scale phenomenon, which the company achieves with an increased level of international transactions globally.



Figure 52 Visa's International Transaction Fee % - Visa Inc.

The next key International Transactions' driver is the International Gross Dollar Volume (GDV) per Visa Card, which is presented in *Figure 53*. In our opinion, the international GDV per card is expected to rise continuously over the forecast period. This rise will be mainly caused by the previously mentioned E-commerce and M-commerce revolutions, as well as by entering the Chinese market, which is expected in early 2017. Moreover, as long as global economic prosperity continues, consumers all over the world will be willing to spend more, both domestically and abroad.

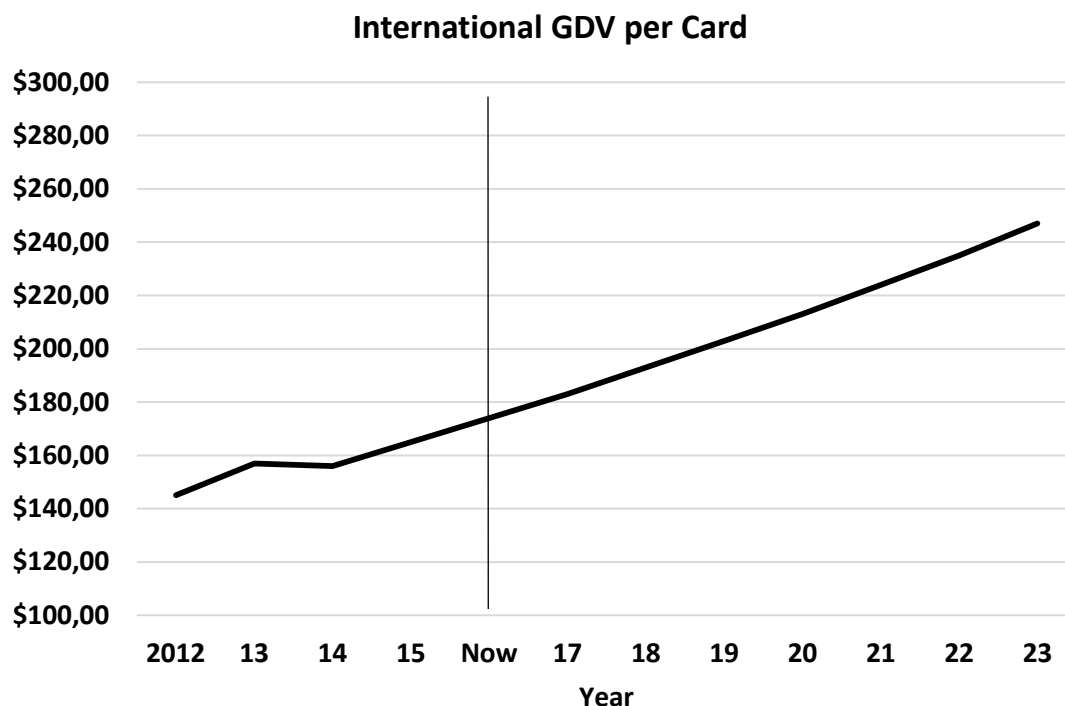


Figure 53 International Gross Dollar Volume (GDV) per Card - Visa Inc.

Besides the total number of Visa cards currently in circulation, rebates as a percentage of the total revenue of this company, and the total number of transactions per card, all of which have already been observed, the Transaction Fees also depend on the Authorization and Settlement Fees charged per transaction. *Figure 54* shows this final driver. We expect this fee to decline slightly over the forecast period due to the current highly competitive environment, especially in China, where Visa Inc. has to compete with China UnionPay, a bankcard Chinese leader that was established in March 2002, and which has about 400 domestic and overseas associate members at this stage (China UnionPay, 2016).

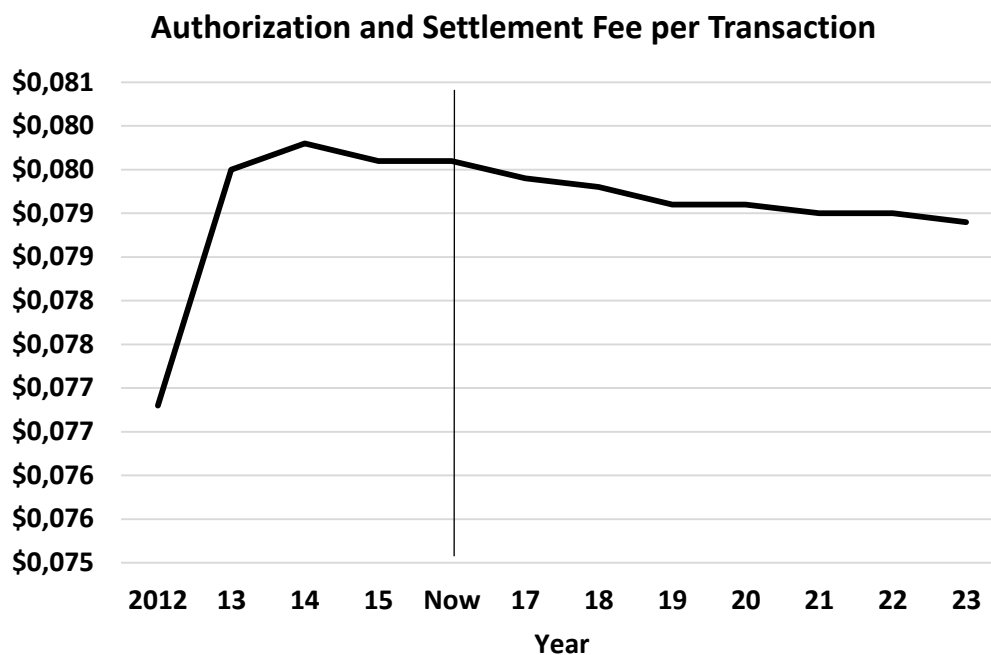


Figure 54 Authorization and Settlement Fee per Transaction - Visa Inc.

The so-called Service Fee mainly depends on (i) Visa's Other Fees, and (ii) Payable Days. The amount of Visa's other fees is projected first, followed by the second key driver.

As can be seen in *Figure 55*, tremendous growth is projected for the company's other sources of revenue such as extra security services, travel and shopping special services, or credit card customization. As Visa Inc. is facing various restrictions regarding Transaction Fees, and as it is operating in the highly competitive payment card industry, other fees might become the only way to increase profit margins. Nevertheless, extra services are certainly very attractive for both current and potential consumers.



Figure 55 Visa's Other Fees - Visa Inc.

We expect the payable days to remain between 100 and 130 days over the valuation period (Figure 56).

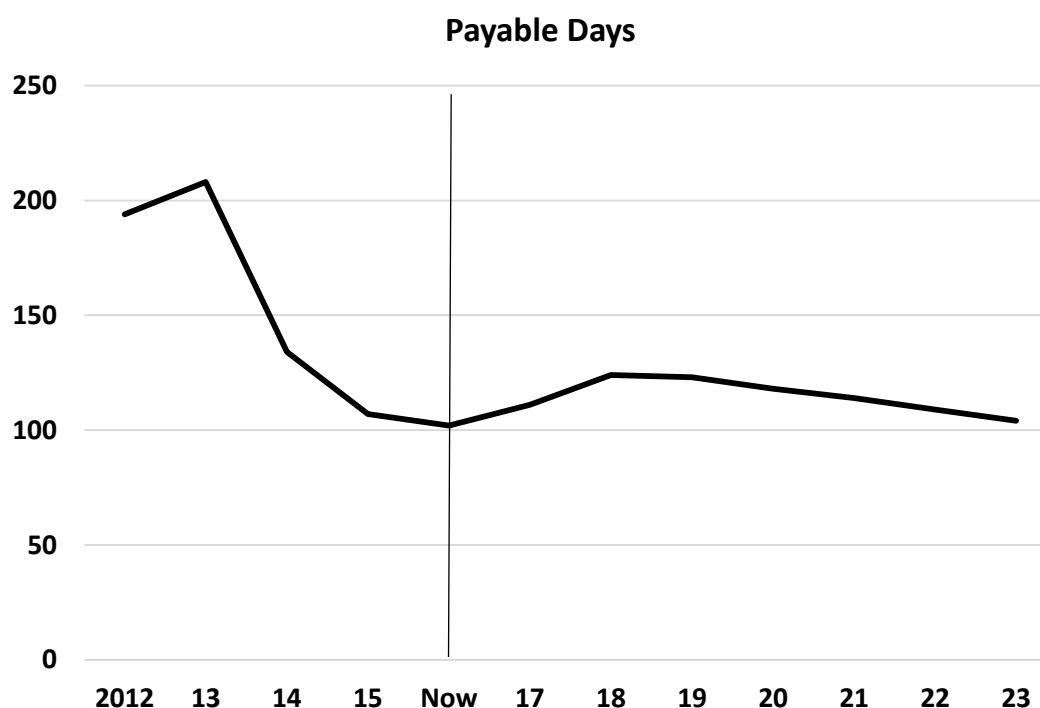


Figure 56 Payable Days - Visa Inc.

Finally, Figures 57, 58, and 59 show the projected revenue, the adjusted EBITDA, and free cash flow, respectively, based on a previous analysis.

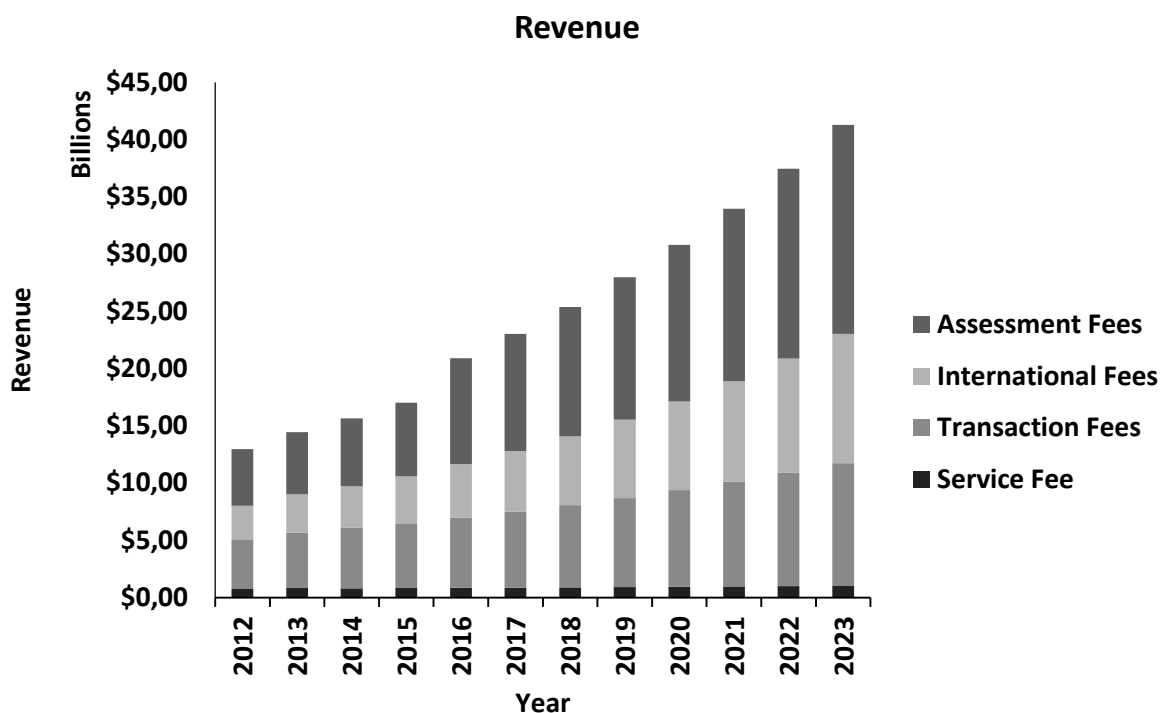


Figure 57 Revenue - Visa Inc.

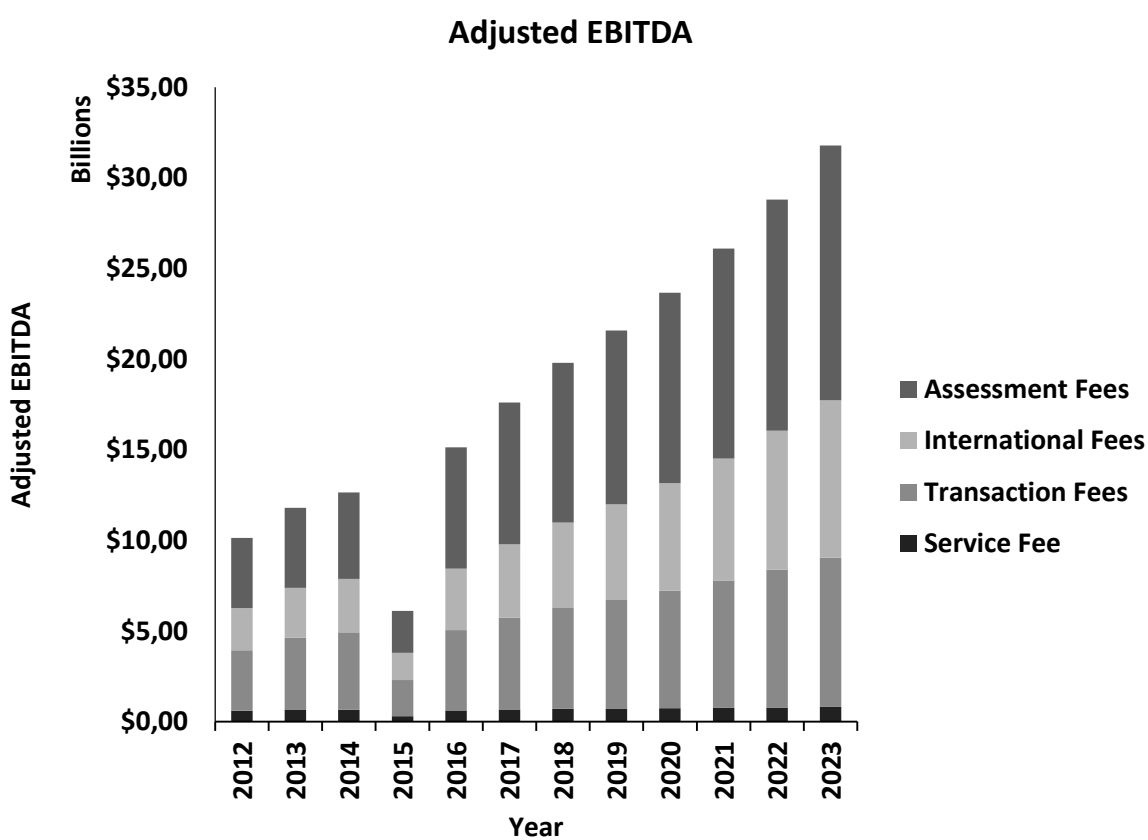


Figure 58 Adjusted EBITDA - Visa Inc.

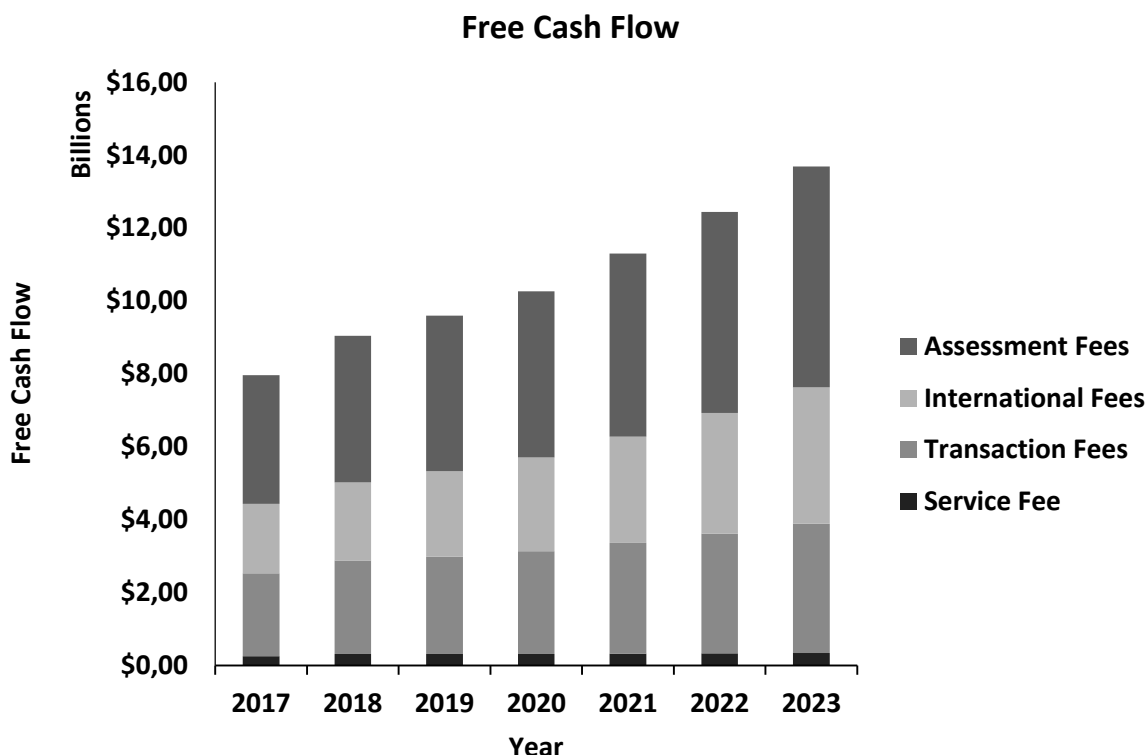


Figure 59 Free Cash Flow - Visa Inc.

Our next sample company is MasterCard Inc., whose current market price is \$96.12 per share, while we estimate a price of \$115. The market capitalization of this company is \$106 billion, whereas our projection accounts for \$127 billion. On the other hand, Trefis (2016b) projects a price of \$106 per share and a market capitalization of \$116 billion. The Transaction Fees and Assessment Fees constitute 36.7% and 29.5%, respectively, of our price estimation for MasterCard Inc. The remaining 33.9% is accounted for by International Fees, Service Fees, and Cash (20.8%, 10.6%, and 2.5%, respectively, of the price).

We analyze the Transaction Fees first, as they refer to 36.7% of the price estimation for this company. As for the key drivers for this revenue, we observe the following: (i) Authorization, Settlement, and Switch Fee per Transaction, (ii) the Company's Connectivity Fee, (iii) the Company's Total Transactions Processed, and (iv) Rebates as a Percentage of Total Revenue.

In brief, as explained by MasterCard Inc. (2016), authorization is the approval of a transaction by or on behalf of an issuer according to defined operations regulations; settlement fees are charged for an exchange of funds, whereas switch fees are charged for the use of the MasterCard Debit Switch (Trefis, 2016b).

As can be seen in *Figure 60*, we forecast no changes in these fees, primarily due to economies of scale. Moreover, despite the very expensive technology required to process all these transactions, the previously mentioned cut-throat competition will force MasterCard Inc. not to increase these fees in order to stay in the game.

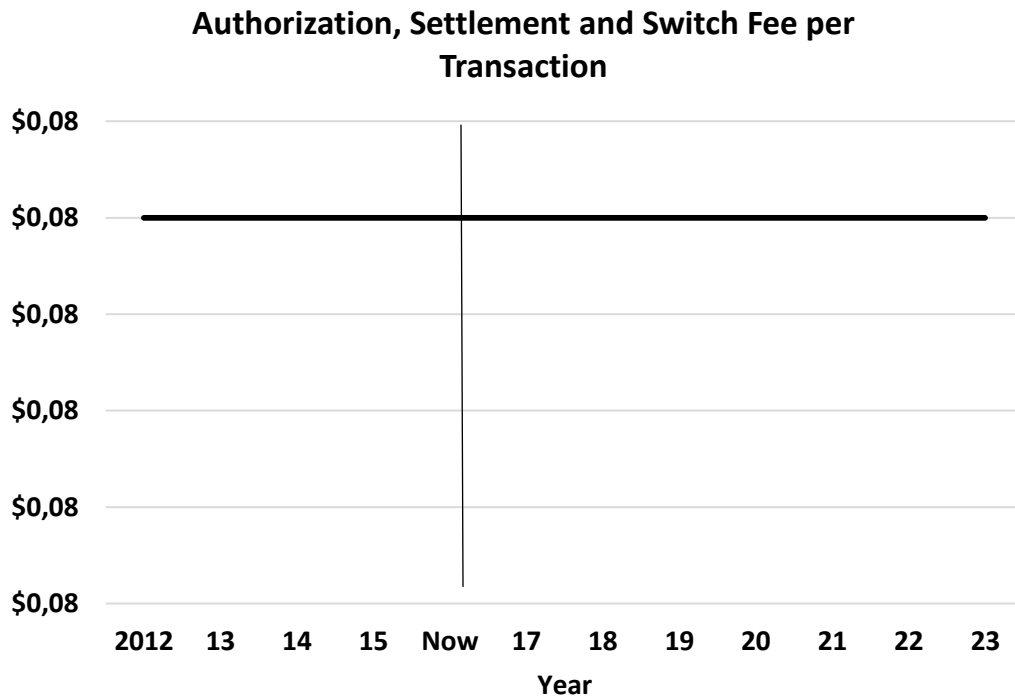


Figure 60 Authorization, Settlement and Switch Fee per Transaction - MasterCard Inc.

Figure 61 shows a projection of MasterCard’s connectivity fees. As can be seen, we forecast moderate growth over the valuation period. Our expectations are supported by the fact that as the authorization, settlement, and switch fees will remain unchanged, the connectivity fees will have to increase due to the state-of-the-art network provided by this company.

Trefis (2016b) does not see any increase, mainly because of the regulations that could restrict the connectivity fees.

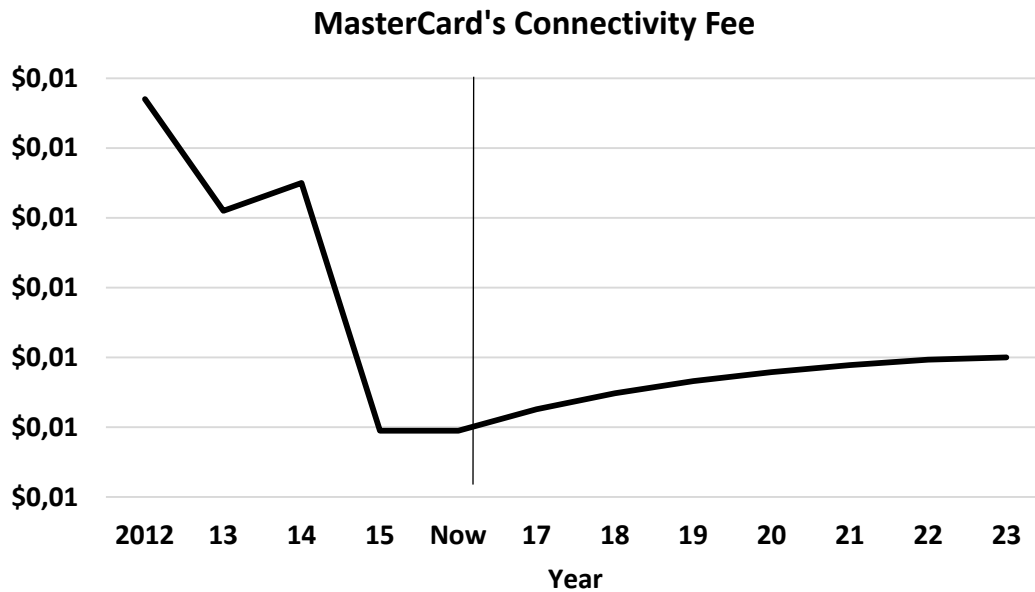


Figure 61 MasterCard's Connectivity Fee

As for the total number of MasterCard's transactions, including those handled by both credit and debit cards, we expect exponential growth over the valuation period (*Figure 62*). There are various reasons for this growth projection, one of which is undoubtedly a cashless society, as previously mentioned in this paper.

On the other hand, the so-called smartphone revolution, which is closely connected to the payment card industry, has led to higher spending among consumers. As noted in MasterCard's (2015) annual report, the continued adoption of mobile devices has resulted in the ongoing convergence of the physical and digital worlds, where consumers are increasingly seeking to use their payment accounts to pay when, where, and how they want.

A sharp increase in the number of MasterCard's transactions is forecast in 2018 due to MasterCard entering the high-potential Chinese market.

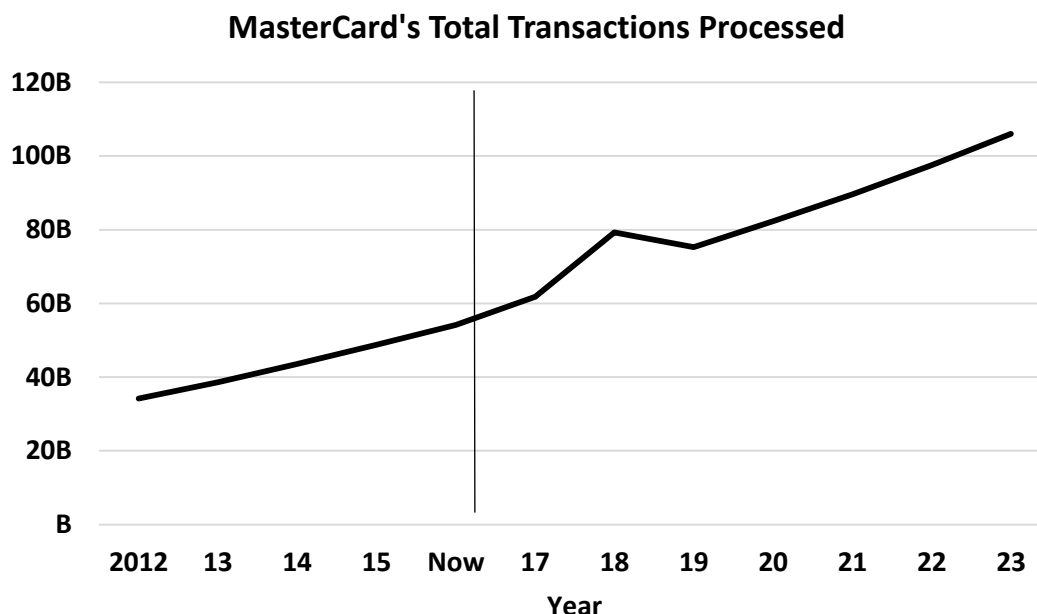


Figure 62 MasterCard's Total Transactions Processed

The next key driver for Transaction Fees is rebates as a percentage of the company's total revenue (*Figure 63*). We expect a marginal decline over the forecast period. In our opinion, there is enough space for this move, as, for example, Visa Inc., one of MasterCard's major competitors, accounts only around 17% of rebates as a percentage of its total revenue.

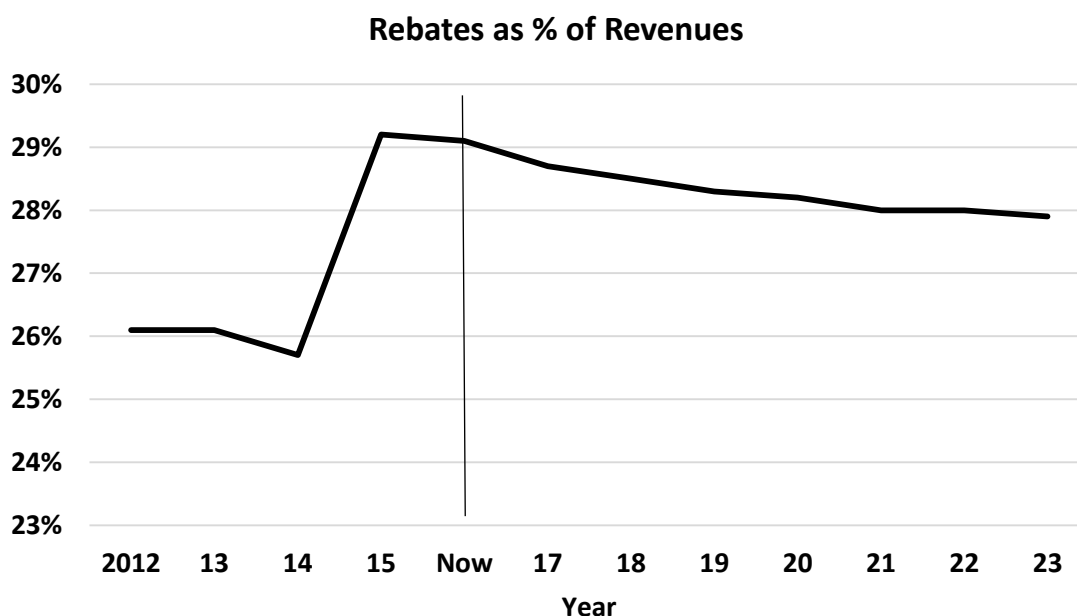


Figure 63 Rebates as % of Revenues

The Assessments, whose key drivers are Assessment Fees, Gross Dollar Volume, and Rebates, make up 29.5% of our estimated MasterCard stock price. As rebates as a percentage of total revenue has already been projected, we are mainly focusing on the company's

assessment fees and its gross dollar volume. We expect MasterCard's assessment fees to remain at around their current level over the forecast period due to a recovering US economy and globalization, which would increase the number of transactions and hence allow the company to cut its fees while maintaining its profit margins at the same level as before (Figure 64).

The second reason for not increasing assessment fees is regulations. For instance, Getter (2011) points out that the Durbin Amendment prohibits network providers and debit card issuers from imposing restrictions that would override a merchant's choice of network provider through which to route transactions. In other words, the payment card networks have to negotiate with merchants according to this regulation. A similar rule has also been introduced among the EU member states.

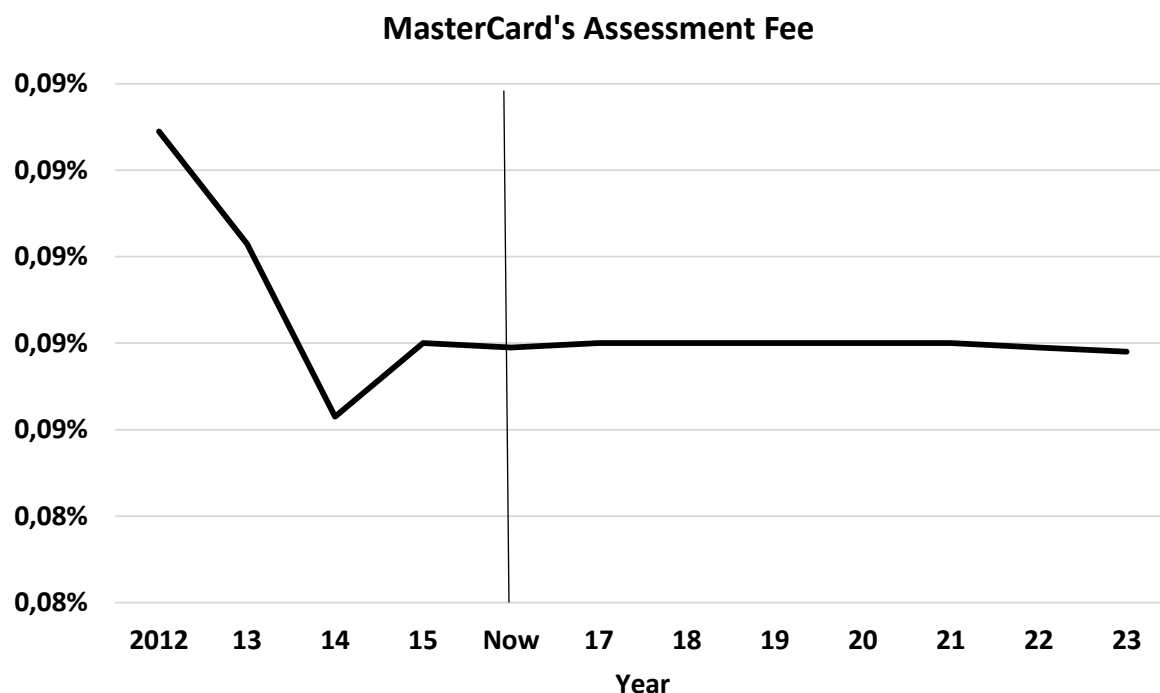


Figure 64 MasterCard's Assessment Fee

As can be seen in Figure 65, we project MasterCard's gross dollar volume (GDV) to exceed \$8.5 trillion over the valuation period due to (i) the growing number of issued credit and debit cards, (ii) the E-commerce and M-commerce revolutions, (iii) and global prosperity after the Great Recession of 2007 to 2009.

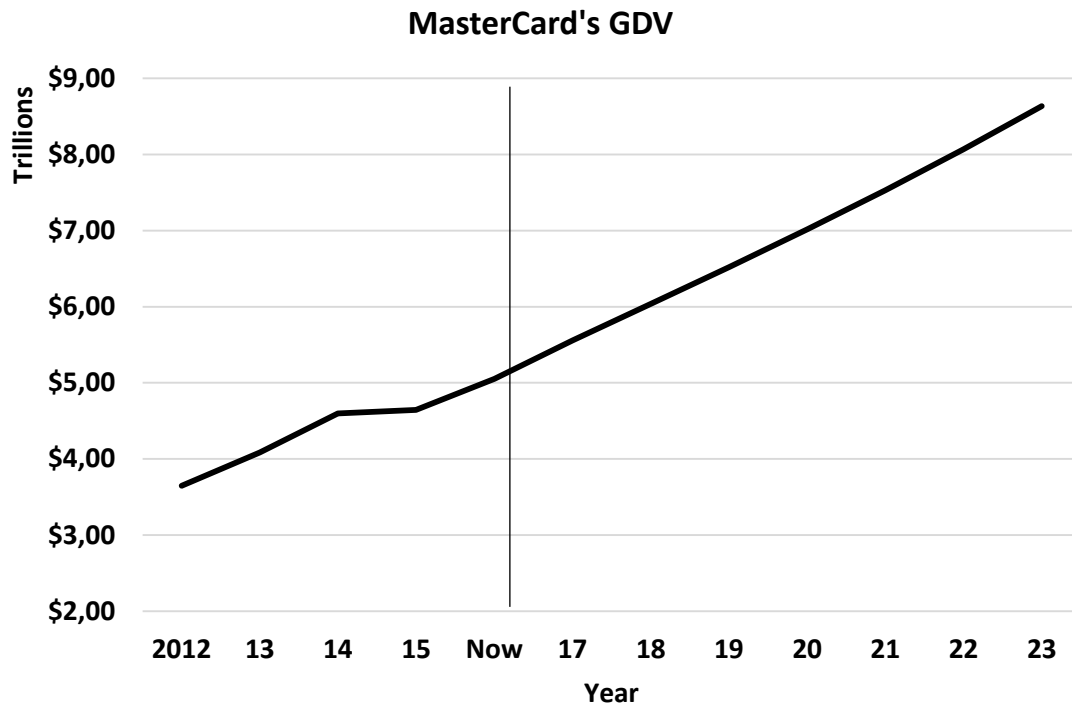


Figure 65 MasterCard's GDV

Figure 66 shows MasterCard's Cross Border Fee, which we expect to remain at its historic level of 0.8%. Our projection is supported by the fact that its major competitors are keeping more or less the same fee.

On the other hand, regulations continue to be a significant issue for this company. For example, as Reuters (2016b) reports, the 2nd US Circuit Court of Appeals in New York threw out a \$7.25 billion antitrust settlement reached by Visa Inc. and MasterCard Inc. with millions of retailers accusing these payment card networks of improperly fixing credit and debit card fees.

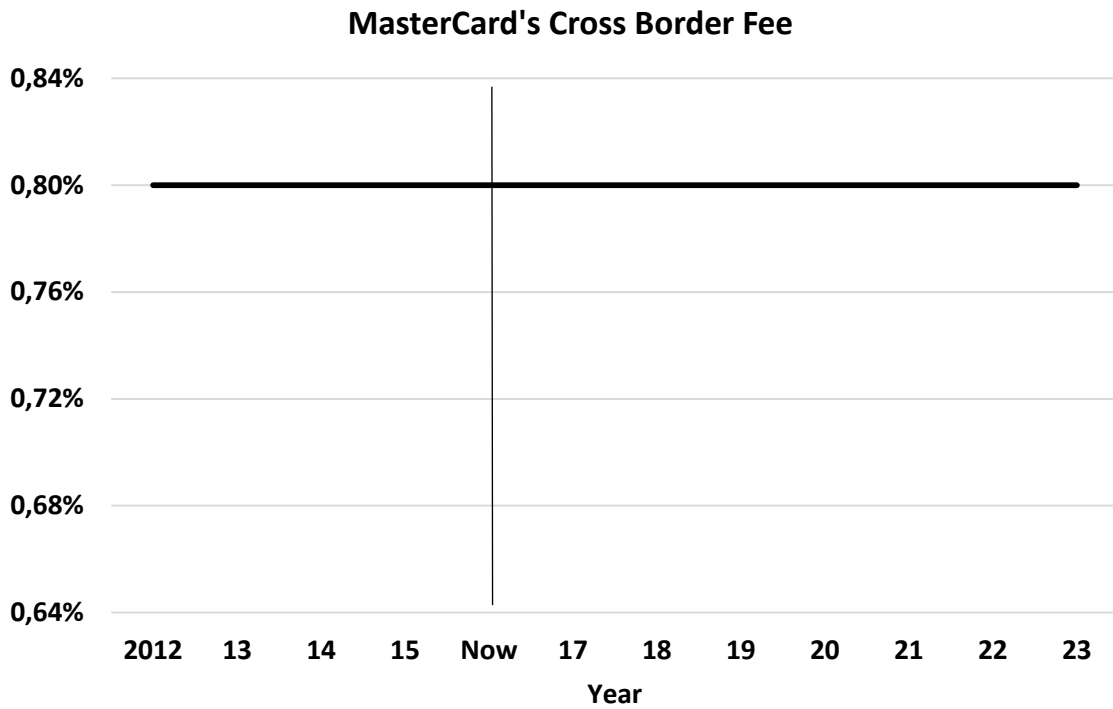


Figure 66 MasterCard's Cross Border Fee

As can be seen in *Figure 67*, MasterCard's Currency Conversion Fee is expected to remain the same over the forecast period, mainly due to economies of scale, which will allow the company not to increase the current fee while maintaining its margins.

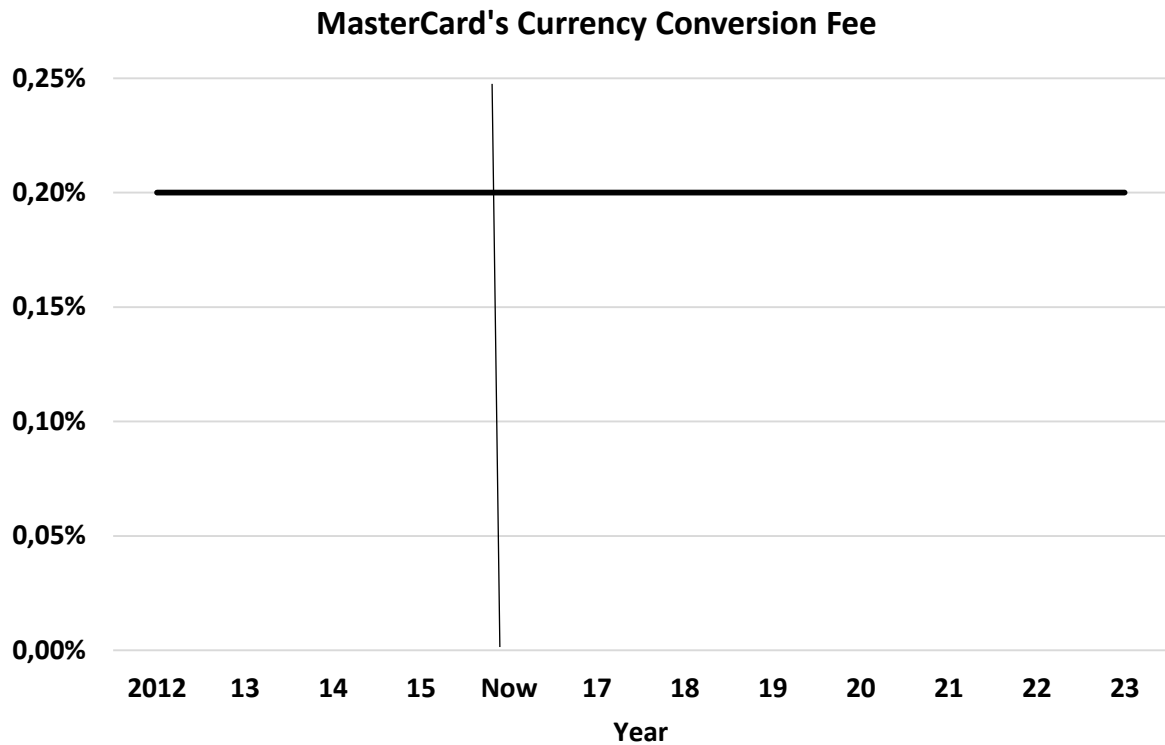


Figure 67 MasterCard's Currency Conversion Fee

The following figure (*no. 68*) shows MasterCard's international transaction gross dollar volume (GDV). As can be seen, we project continuous growth over the valuation period. The smartphone revolution and the golden era in the tourism market have indeed boosted the international transaction GDV of this company.

Our projection is primarily caused, however, by the recent announcement about the partnership between MasterCard Inc. and the cross-border payments firm Plastiq Inc.¹⁷ As Business Insider (2016) reports, the partnership between these companies will allow Chinese consumers to pay US university tuition fees via credit or debit cards. According to the same source, Planet Payment Inc.¹⁸, which is also involved in this process, will help with currency conversion, while Plastiq Inc. will process card payments as checks or electronic bank transfers.

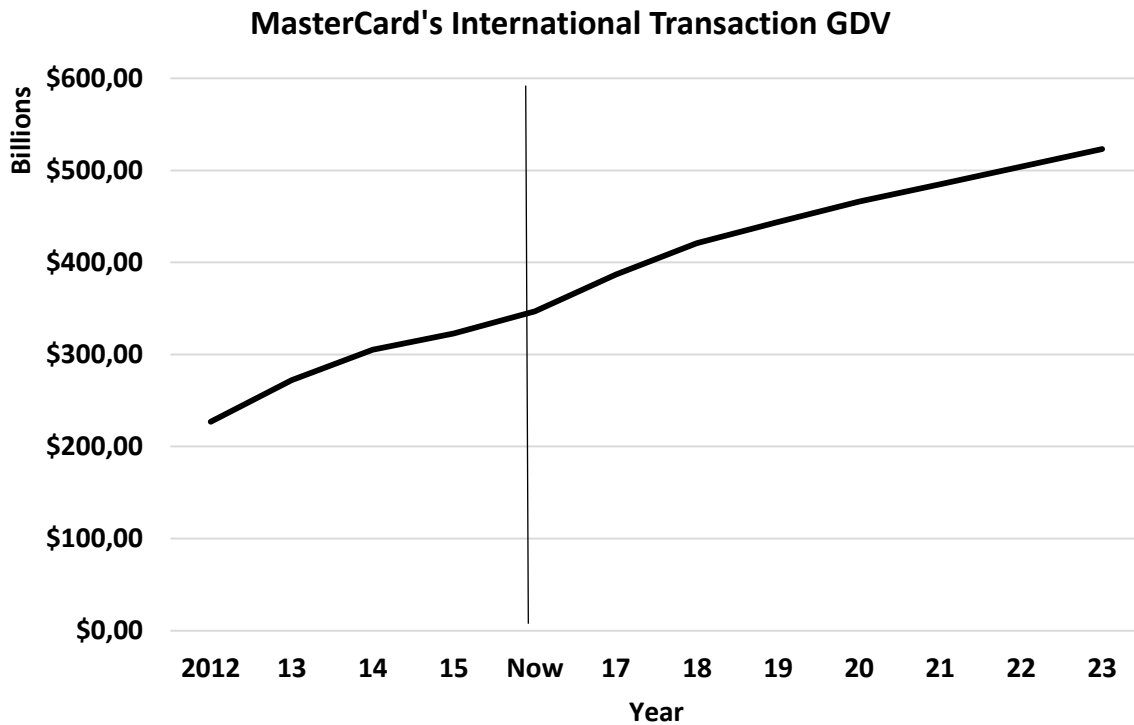


Figure 68 MasterCard's International Transaction Gross Dollar Volume (GDV)

Service Fees constitute 10.6% of our price estimate for MasterCard Inc. As for Visa Inc., we forecast tremendous growth for MasterCard's other sources of revenue (*Figure 69*) such as consumers' extra protection fees, or consulting and research fees, as proposed by Trefis (2016b). Moreover, Porter's five forces analysis, previously mentioned in this paper, indicated that these companies offer more or less similar products; therefore, other services are good ways of providing consumers with something new, while increasing profit margins.

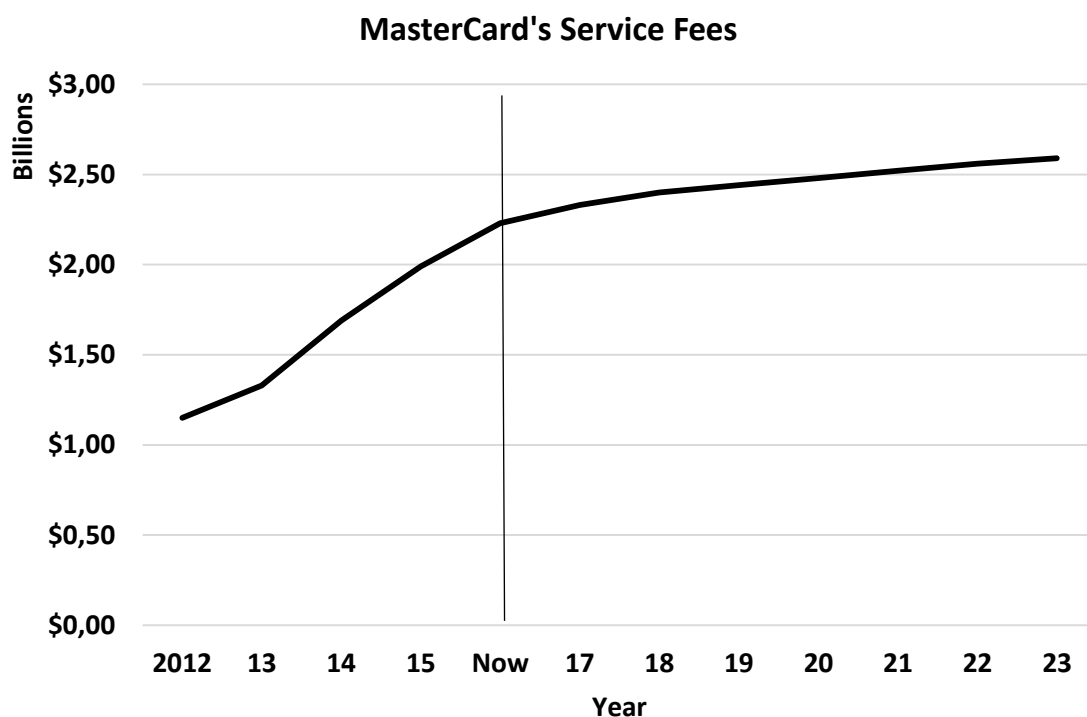


Figure 69 MasterCard's Service Fees

Figures 70, 71, and 72 show the projected revenue, the adjusted EBITDA, and free cash flow, respectively, based on a previous analysis.

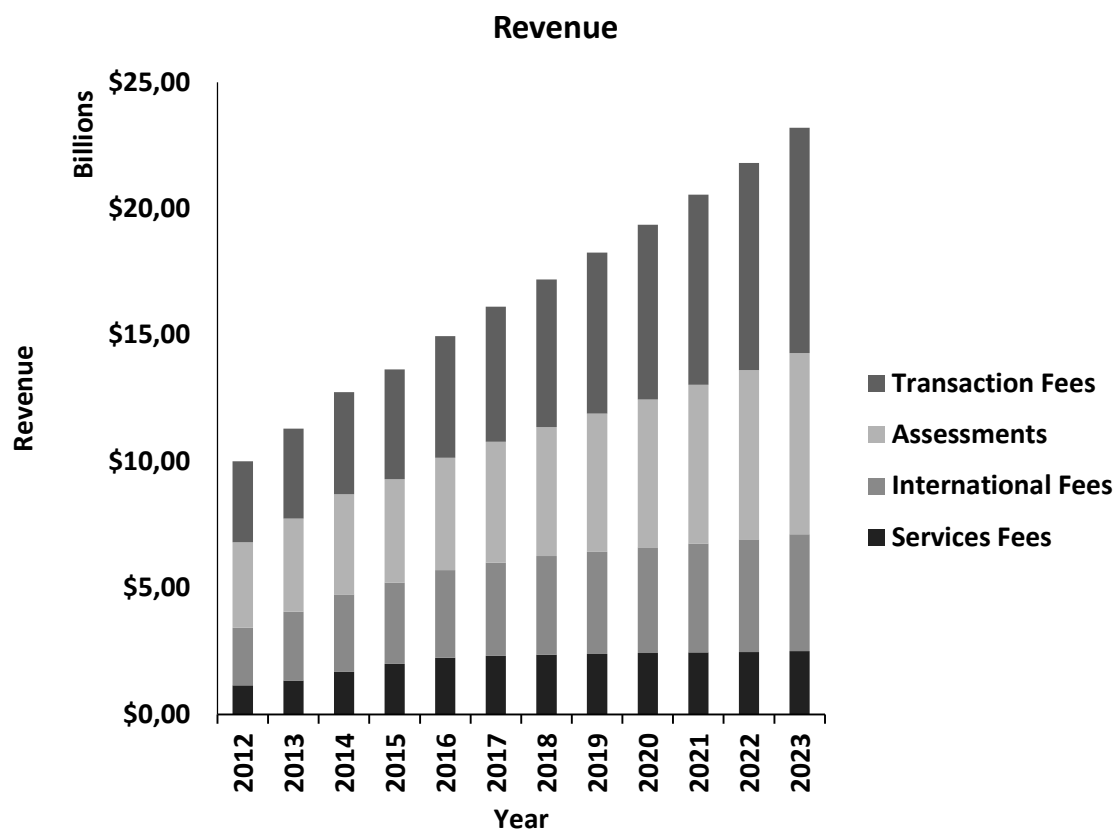


Figure 70 Revenue - MasterCard Inc.

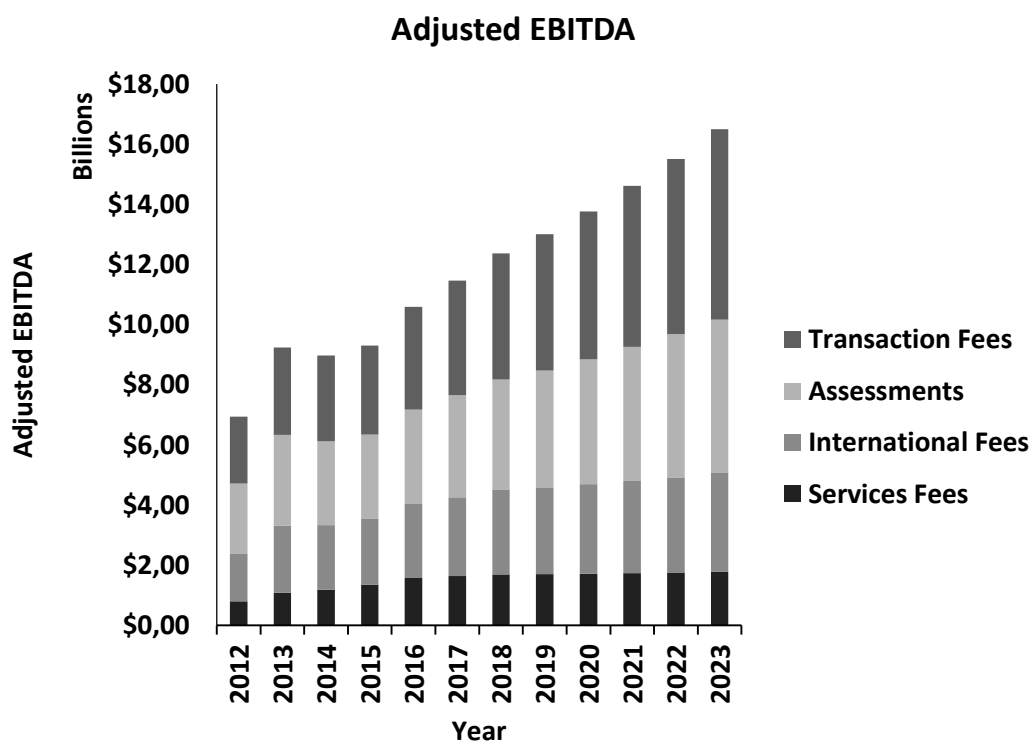


Figure 71 Adjusted EBITDA - MasterCard Inc.

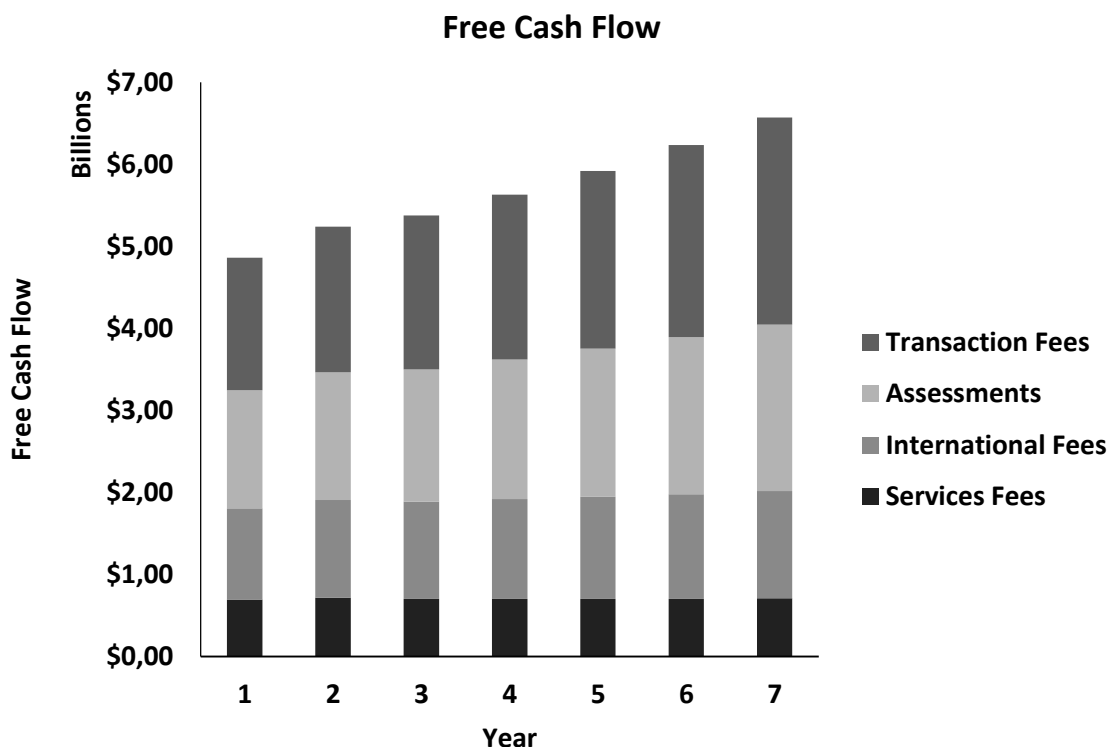


Figure 72 Free Cash Flow - MasterCard Inc.

In the following part we analyze the American Express Company, whose current market price is \$65.38 per share, while we estimate a price of \$75.89. The market capitalization of this company is \$62.0 billion, whereas our projection accounts for \$72.0 billion. A comparable valuation carried out by Trefis (2016a) estimates a price of \$72.45 per share and a market capitalization of \$68.8 billion. As can be seen, these results are much closer to our projection than in the previous two.

69.3% of our price estimation for the American Express Company refers to the Card Transaction and Execution Fees. As the key drivers for these sources of revenue, we analyze the following: (i) Transaction Fees on American Express Issued US Cards; (ii) the Total Number of Cards Issued in the US; (iii) US Card-Member Spend on American Express Issued Cards.

As can be seen in *Figure 73*, we forecast the transaction fees on American Express issued cards to decrease continuously over the valuation period, getting close to 1.60%. As noted in the 2015 American Express Annual report, the company has made progress on many fronts, including strong loan growth, industry leading credit quality, higher transaction volumes, and encouraging results from investments to expand their card-member and merchant bases. All of these will undoubtedly lead to a reduction in their transaction fees, thus strongly supporting our estimation.

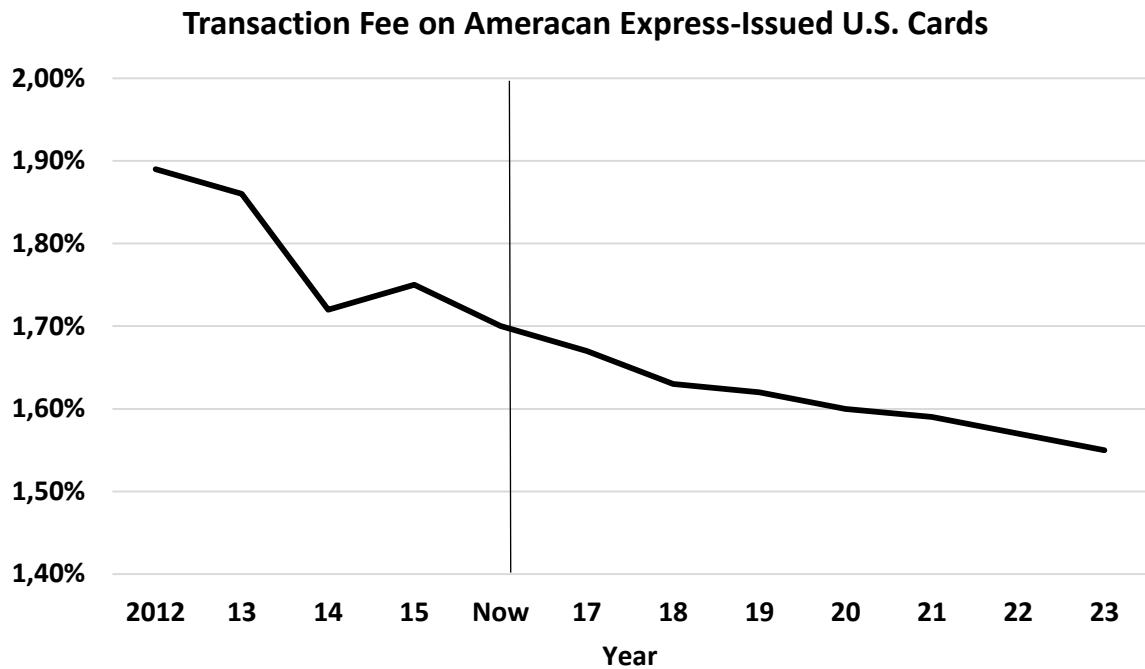


Figure 73 Transaction Fee on the American Express - Issued U.S. Cards

Figure 74 shows the total number of proprietary American Express cardholders based in the US. We forecast steady growth over the valuation period due to the smartphone revolution, a growing economy, a broader acceptance of American Express branded cards, and many other supporting facts. For instance, TrendForce (2016), a global provider of market intelligence on the technology industries, expects a 37.8% year-on-year increase in the total revenue of the worldwide mobile payment market. On the other hand, EMarketer (2015) argues that the number of people in the US using their phones to pay for goods and services at the point of sale will continue to climb steadily; they expect the total value of mobile payment transactions in the US to grow by 210% in 2016.

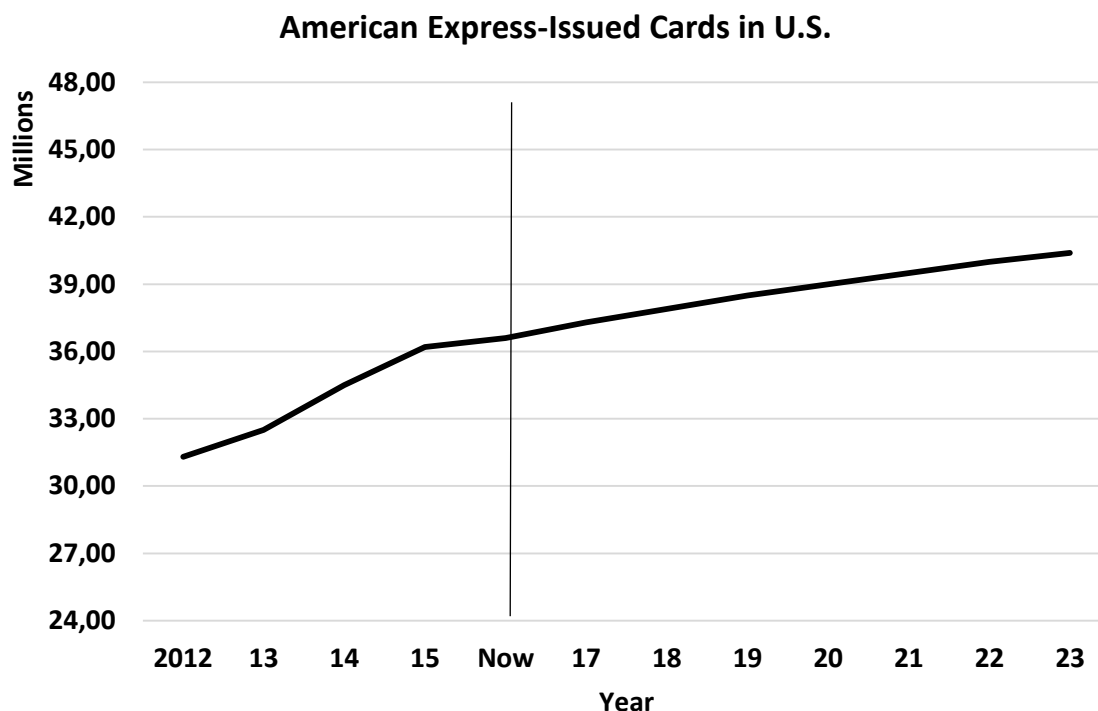


Figure 74 American Express-Issued Cards in U.S.

The American Express Company is usually a synonym for luxury, tradition, originality, and trustworthiness in the payment card industry. It is a well-known company, whose cardholders spend much more compared to those using other payment card networks such as Visa or MasterCard. As cardholders using American Express branded cards have significantly higher spending margins, the company is able to charge merchants higher fees, meanwhile providing its clients with new loyalty programs and rebates, and hence attracting new customers and retaining current ones.

Due to the above-mentioned reason, we expect the US card-member spend on American Express issued cards to increase sharply over the forecast period (*Figure 75*). Moreover, this company might also benefit from the global trend of introducing cashless societies.

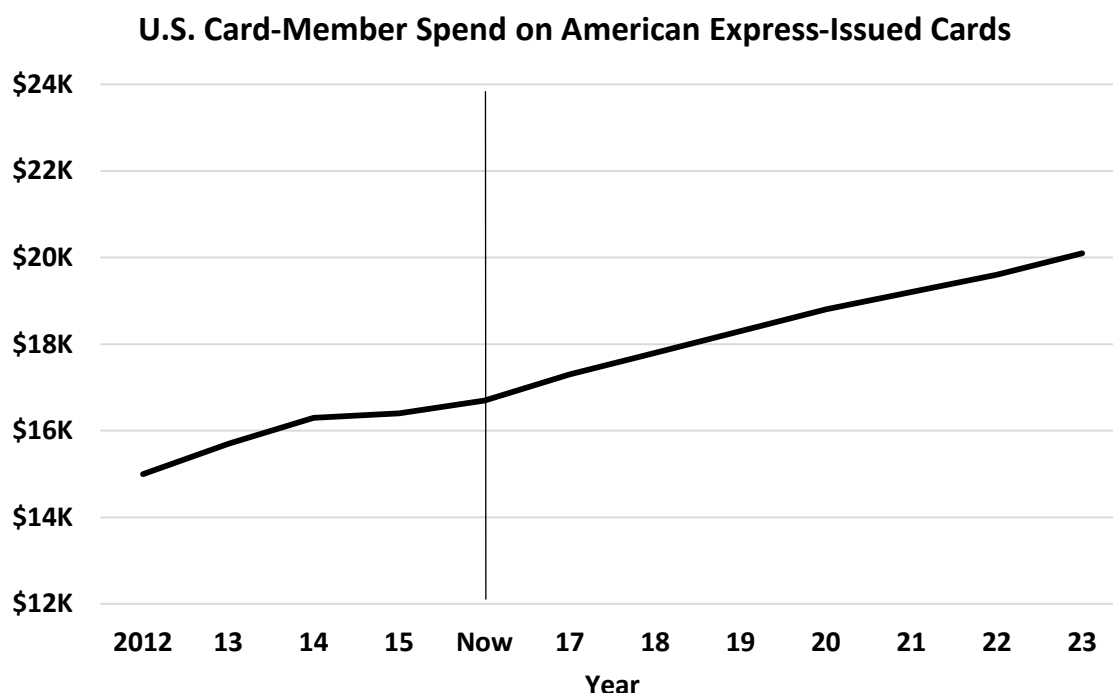


Figure 75 U.S. Card-Member Spend on American Express - Issued Cards

The interest from credit cards and investments constitutes 13.9% of our stock price estimate for the American Express Company, and is analyzed next in this paper. Besides the already observed total number of American Express issued cards in the US, the interest from credit cards and investments depends on (i) the Net Interest Yield on Credit Card Loans in the US, (ii) the Average Loan Balance per Card Member in the US, and (iii) the Amount of Money Spend per Card Member.

We expect the net interest yield on credit card loans (*Figure 76*) in the US to remain at its current level. No decline is forecast due to the company's wealthy consumers, and the fact that the US economy, whose growth is projected to be around 2% during the next few years (International Monetary Fund, 2016), might be considered as strong at this point. On the other hand, we do not see any increase in the net interest yield on credit card loans in the US mainly because of the Credit Card Act signed by the US President Barack Obama in 2009. For example, among others, a particularly interesting part of this law stipulates the requirement for advance notice of an increase in the interest rate:

"In the case of any credit card account under an open end consumer credit plan, a creditor shall provide a written notice of an increase in an annual percentage rate (except in the case of an increase described in paragraph (1), (2), or (3) of section 171((b)) not later than 45 days prior to the effective date of the increase (Federal Government of the United States of America, 2009)."

As can be seen, thanks to this law card members are now able to manage their payment schedules in a much more effective way, and hence either avoid eventual increases in the interest rate or wait for new decreases.

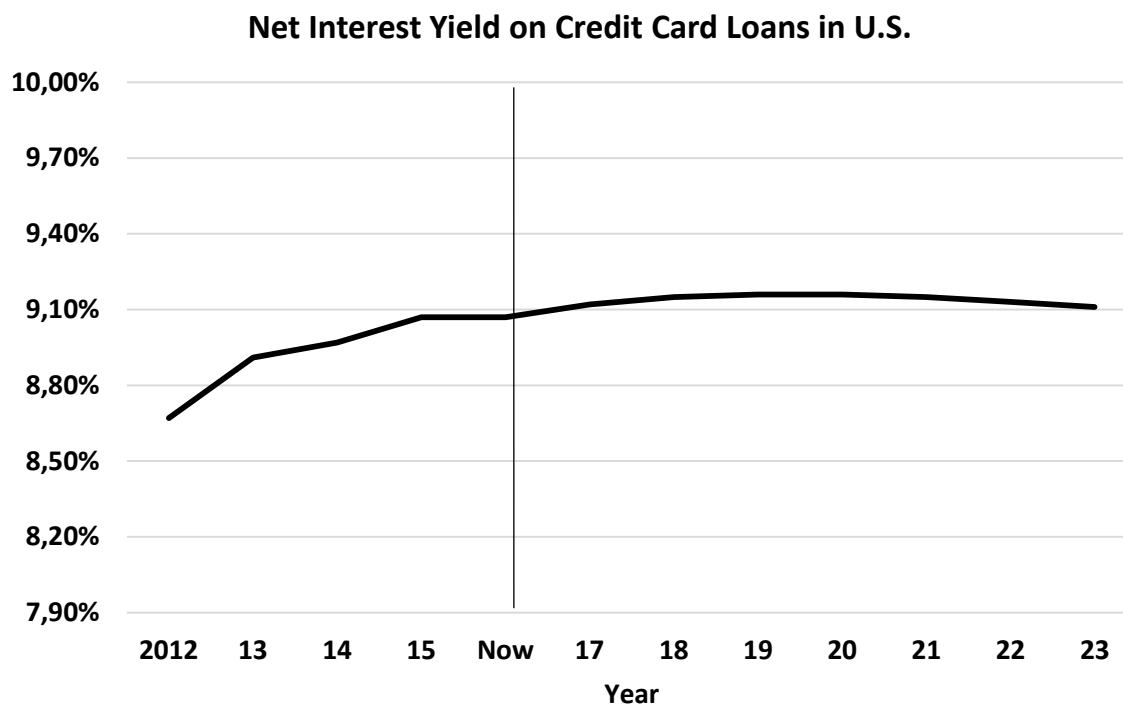


Figure 76 Net Interest Yield on Credit Card Loans in US

We forecast a marginal increase in the Average Loan Balance per American Express Card Member in the US, mainly due to the country's strong economy (*Figure 77*).

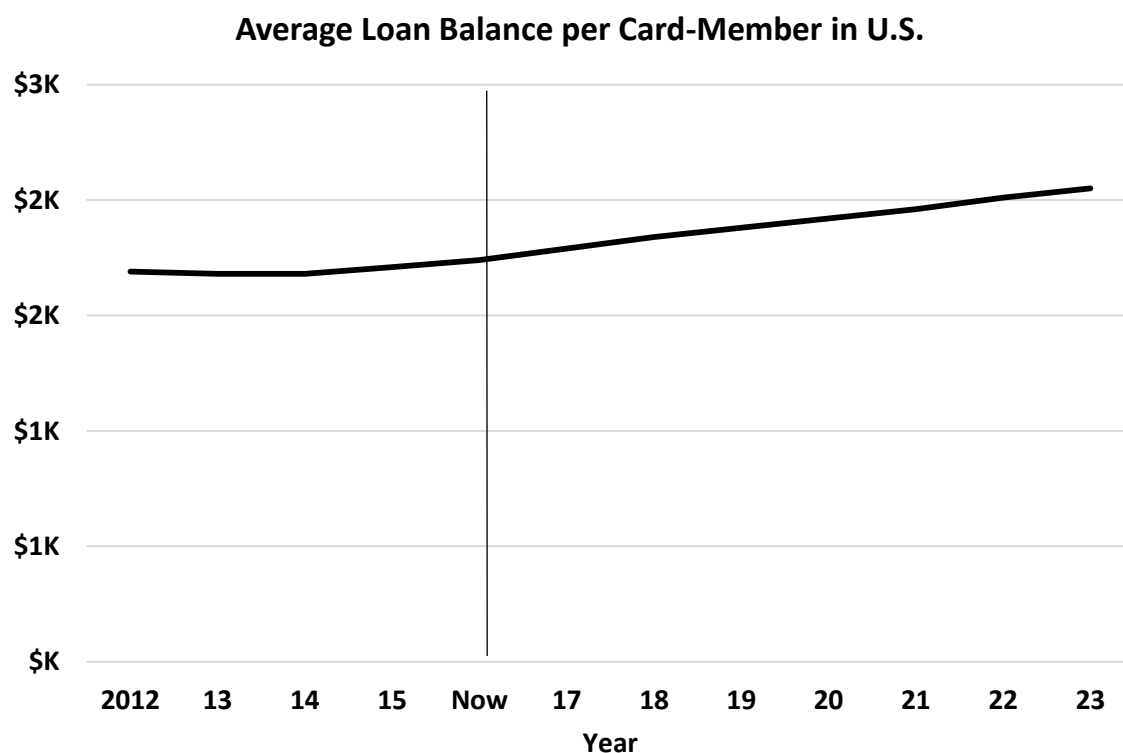


Figure 77 Average Loan Balance per Card-Member in U.S.

The Card Membership Fees refer to 8.3% of our price estimate for the American Express Company. Besides the total number of American Express cards issued in the US, we consider the Annual Card Membership Fee and the Total Number of American Express Corporate Cards-in-Use as the key drivers of the card membership fees.

We expect the new annual card membership fee to exceed \$55 over the forecast period (*Figure 78*), as the company has a longer tradition and keeps positioning itself as the most luxurious payment card brand. There have been several increases recently. For instance, the company increased its card membership fees for the Premier Rewards Gold Card and Standard Gold Card in June 2015; according to Yahoo Finance (2015), the company increased its fees for the Gold Card from \$125 to \$160 a year, whereas its fees for the Premier Rewards Gold Card went from \$175 to \$195 a year.

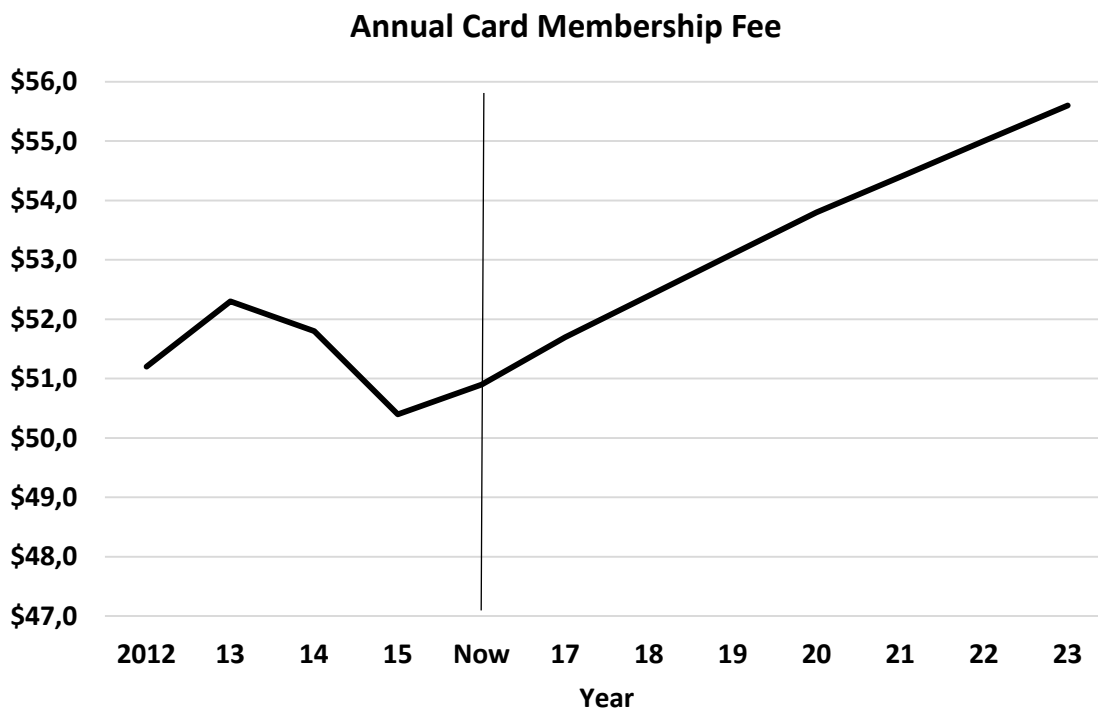


Figure 78 Annual Card Membership Fee

As for the number of American Express issued corporate cards-in-use, we forecast a marginal increase over the valuation period, mainly due to the strong macroeconomic growth in the US (*Figure 79*). However, we do not project further growth, as companies nowadays have many different possibilities to save money; for example, instead of going on business trips, which would be a considerable cost for a company, employees from different subsidiaries might hold online meetings, thus preventing unnecessary expenditure.

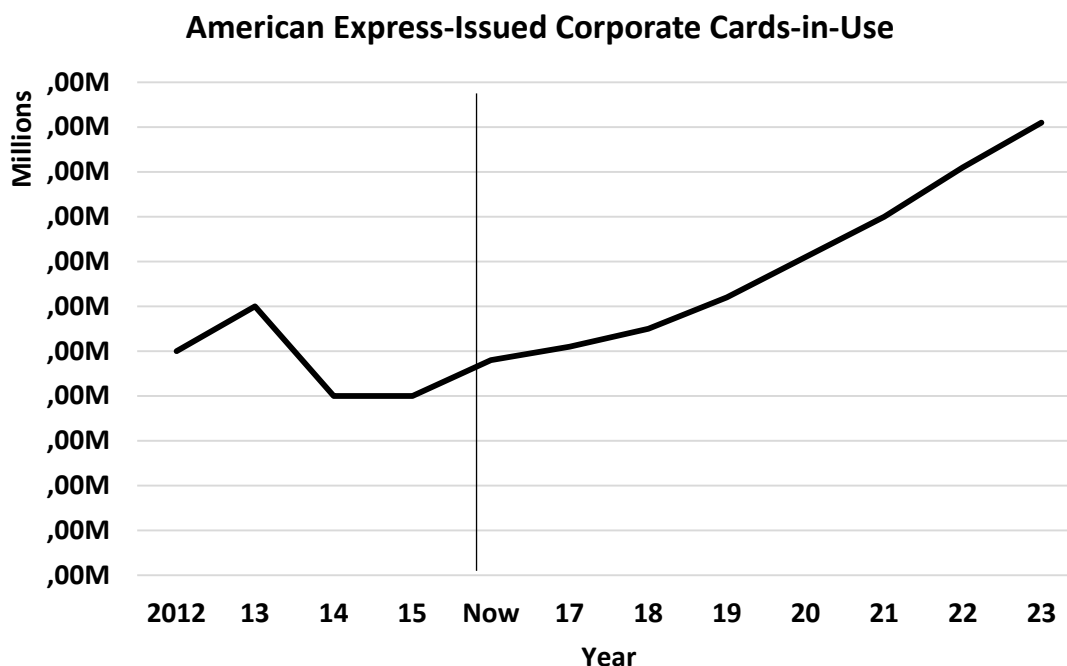


Figure 79 The American Express Issued Corporate Cards-in-Use

Credit Card Securitization and Publishing, whose key driver is the Securitization of Loans, Publishing, and Other Revenues, account for 6.0% of our price estimate for the American Express Company. As can be seen in *Figure 80*, after picking up in 2014, the securitization of loans, publishing, and others revenues bottomed out in 2015. Nevertheless, we expect it to increase slightly over the forecast period, in line with business growth.

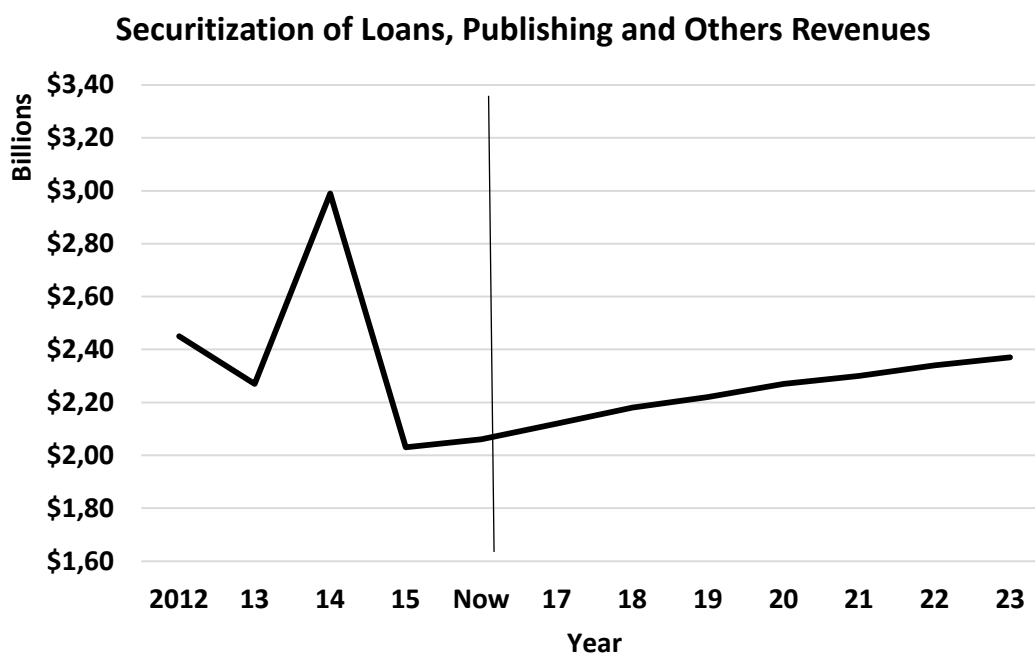


Figure 80 Securitization of Loans, Publishing and Others Revenues

Travel Services constitute 2.4% of our price estimate for the American Express Company. As for the key drivers of this price estimate part, we observe (i) the Commission Charged on Travel Sales in the US, and (ii) Travel Sales in the US.

We forecast a significant decrease in the level of Commission Charged on Travel Sales in the US because tourism is a very competitive industry, and certainly not the prime business of the American Express Company (*Figure 81*).

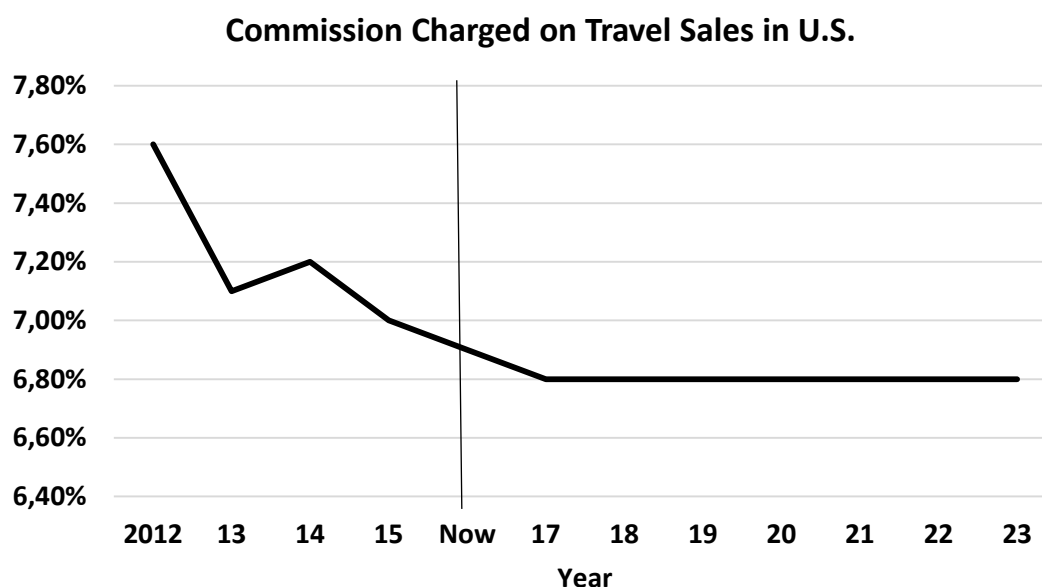


Figure 81 Commission Charged on Travel Sales in U.S.

As for the amount of money earned by travel services in the US, we expect a continuous decline in this value over the forecast period due to more or less similar reasons to the projected decrease in the commission charged on these services (*Figure 82*).

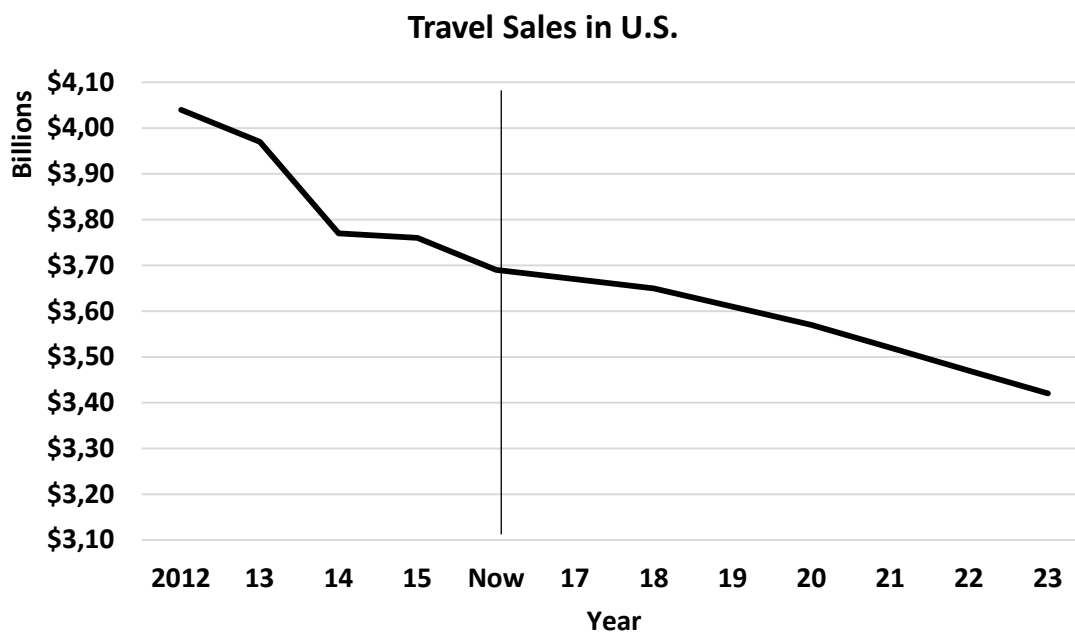


Figure 82 Travel Sales in U.S.

Finally, Figures 83, 84, and 85 show the projected revenue, the adjusted EBITDA, and the net income of the American Express Company, respectively, based on a previous analysis.

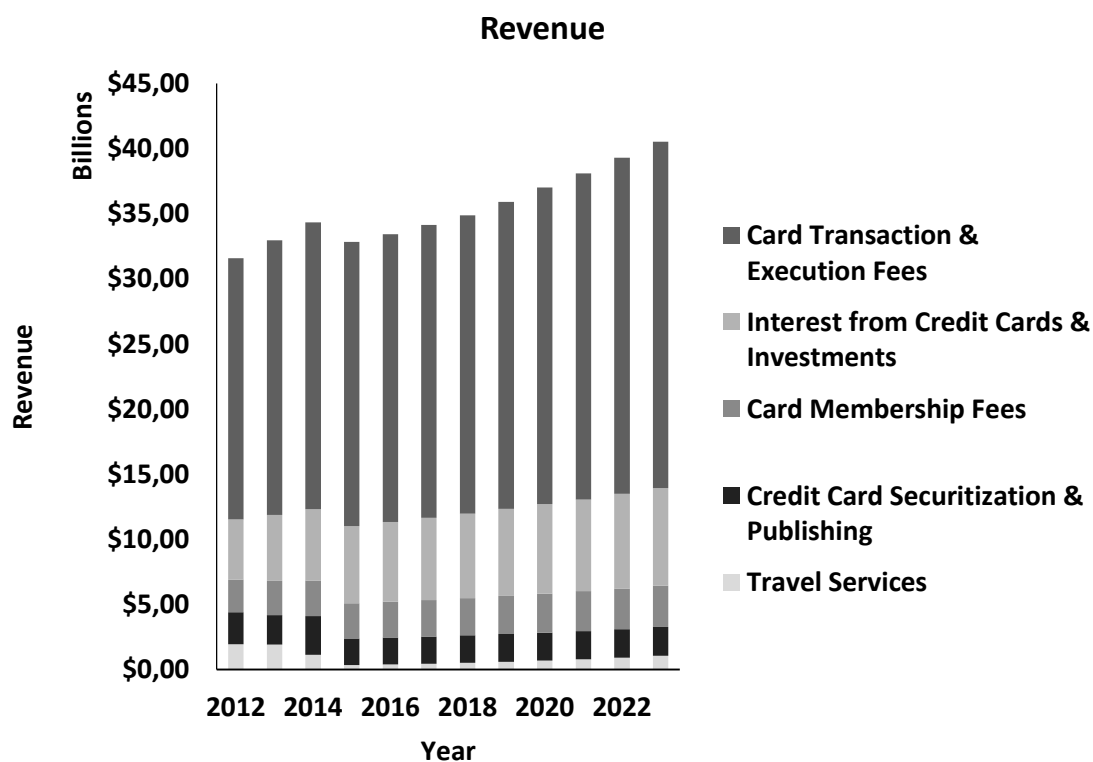


Figure 83 Revenue - the American Express Company

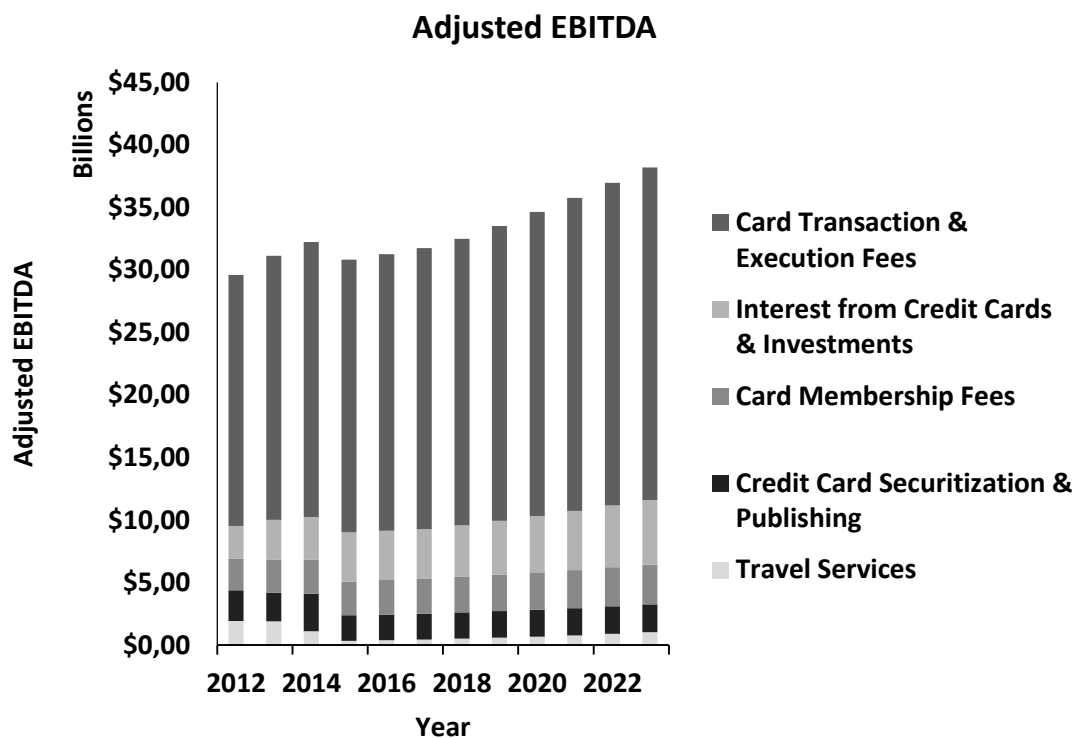


Figure 84 Adjusted EBITDA - the American Express Company

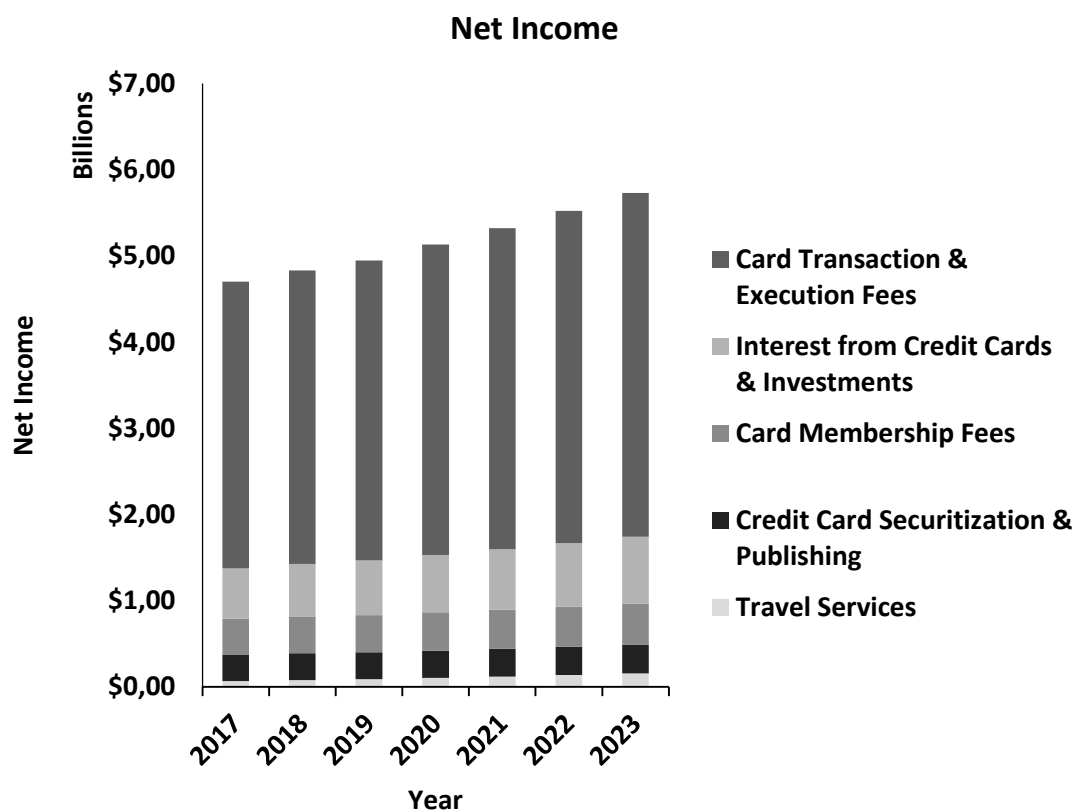


Figure 85 Net Income - the American Express Company

Next, we provide the results of the technical analyses. As indicated in the methodology section, the trend observation is started with the moving averages. *Figure 86* shows the simple, weighted, and exponential 10-day moving averages based on the daily closing prices for Visa Inc. For instance, an established downtrend in closing prices from the middle of June 2016 can be seen; therefore, according to the simple moving average (red line), whenever a stock price closes below the moving average, it is a sell signal. The same rules for potential buy and sell signals might also be applied for both the weighted and exponential moving averages.



Figure 86 Visa Inc. - Simple, Weighted, and Exponential Moving Average
The simple, weighted, and exponential moving averages are presented by red, green, and blue line, respectively

A similar downtrend, established from the middle of June 2016, can be noticed in the closing prices for MasterCard Inc. and American Express Company (*Figures 87 and 88*). Consequently, the right moment for a sell action should be considered by the investors of the sample companies.



Figure 87 MasterCard Inc. - Simple, Weighted, and Exponential Moving Average
The simple, weighted, and exponential moving averages are presented by red, green, and blue line, respectively



Figure 88 American Express Company - Simple, Weighted, and Exponential Moving Average
The simple, weighted, and exponential moving averages are presented by red, green, and blue line, respectively

As can be seen in Figure 89, the current trend in stock prices of Visa Inc. has lost its upwards momentum due to the fact that Aroon Up fell below 50; on the other hand, a strong downtrend can be seen, as Aroon Down rose above 70. Similarly, the Aroon Oscillator indicates that a downward trend is underway.



Figure 89 Visa Inc. - Aroon Oscillator

Figure 90 shows that Aroon Up declined to below 50, referring to the loss of the current trend upwards momentum, while Aroon Down indicates a strong downtrend. Moreover, the Aroon Oscillator confirms that a downward trend is underway.



Figure 90 MasterCard Inc. - Aroon Oscillator

Aroon Up falling below 30 indicates that, in the case of the American Express Company (Figure 91), a strong trend in the opposite direction is underway.



Figure 91 American Express Company - Aroon Oscillator

If we observe *Figure 92*, which shows the Chaikin Money Flow indicator for Visa Inc., a strong selling pressure can be noticed, as the indicator is currently negative. In other words, the fact that the indicator is below 0 refers to a continuous fall in stock prices.



Figure 92 Visa Inc. 20 - Period Chaikin Money Flow

Since there is a bearish trend from June 2016 in the stock prices of MasterCard Inc., and the Chaikin Money Flow indicator is negative, traders should go short, due to the fact

that the prices will probably continue to fall (*Figure 93*). Moreover, the zero line crosses should also be analyzed. As can be seen in the same figure (*no. 93*), the bullish crosses were followed by a price increase, whereas the bearish crosses were followed by a price fall.



Figure 93 MasterCard Inc. - 20 Period Chaikin Money Flow

According to the Chaikin Money Flow indicator (*Figure 94*), the stock prices of the American Express Company will fall in the immediate future. Consequently, investors should go short.

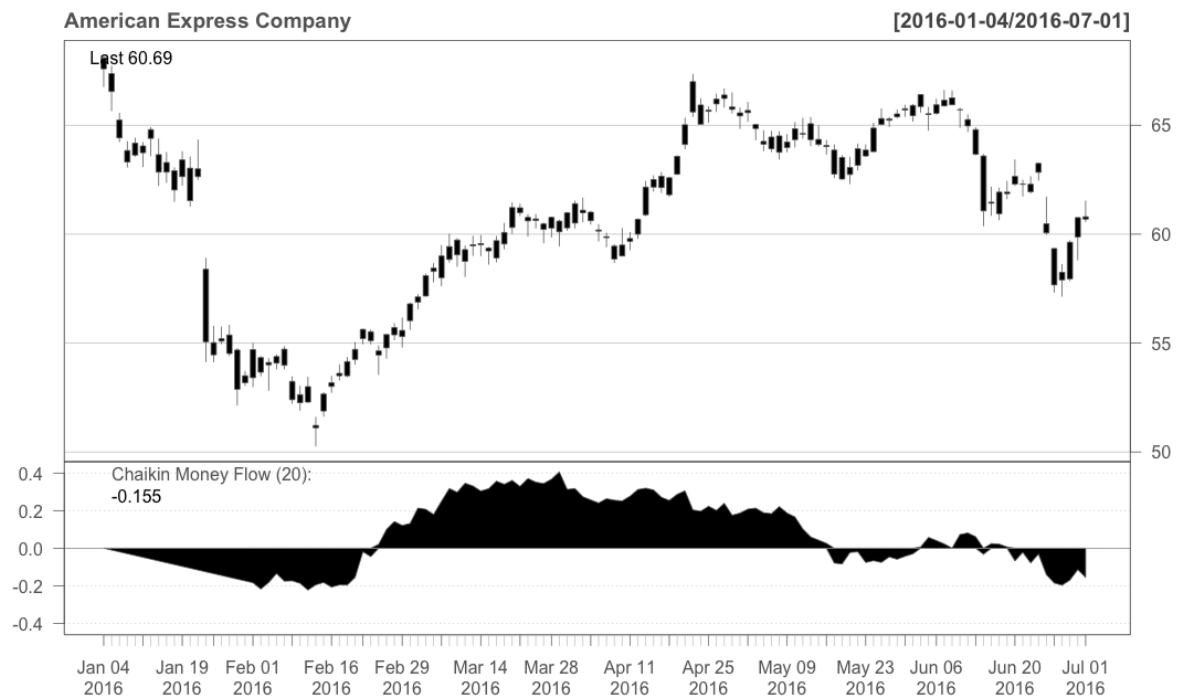


Figure 94 American Express Company - 20 Period Chaikin Money Flow

Figure 95 shows the accumulation-distribution line (ADL) for Visa Inc. As can be seen, the ADL followed the direction of the price movements more or less during the whole investigated period, confirming either a strong uptrend or downtrend.



Figure 95 Visa Inc. - Accumulation-Distribution Line (ADL)

Similar conclusions might be made for other sample companies (*Figures 96 and 97*). This means that the ADL is indeed a reliable indicator, whose purpose is to confirm the trend of a security.



Figure 96 MasterCard Inc. - Accumulation-Distribution Line (ADL)



Figure 97 American Express Company - Accumulation-Distribution Line (ADL)

Next, the On Balance Volume (OBV) can be observed; it is, as noted in the methodology section, a similar indicator to the ADL. Since the indicator's absolute value is

not so considerable, we mainly focus on the line movements. *Figure 98* shows the OBV line for Visa Inc. For instance, it confirms the price movement to be trending downward as prices drop, and vice versa.



Figure 98 Visa Inc. - On Balance Volume

However, a divergence was not seen in any of the sample companies, due to the fact that the price movement was always confirmed by the indicator. Therefore, the usefulness of this indicator is seen only in its confirmation of the trend, regardless of its other, more significant features.



Figure 99 MasterCard Inc. - On Balance Volume

Figures 99 and 100 show the OBV for MasterCard Inc. and the American Express Company, respectively.



Figure 100 American Express Company - On Balance Volume

Knowing that the basic function of the Chaikin Volatility indicator is to measure momentum for the ADL poses a significant fact, before it is taken into consideration. As can

be seen in *Figure 101*, the indicator entered positive values from the middle of June 2016, which means that the ADL of Visa Inc. was rising, indicating that buying pressure prevailed.



Figure 101 Visa Inc. - Chaikin Volatility

As for MasterCard Inc., for a long period of time the Chaikin Volatility indicator was in the negative zone, meaning that the ADL was falling, while the selling pressure prevailed (*Figure 102*).



Figure 102 MasterCard Inc. - Chaikin Volatility

The example of the American Express Company is particularly interesting. As *Figure 103* shows, after a sharp rise in Chaikin Volatility at the beginning of June, the indicator declined rapidly. This is reflected in the ADL movements, as well as in buying and selling pressure.

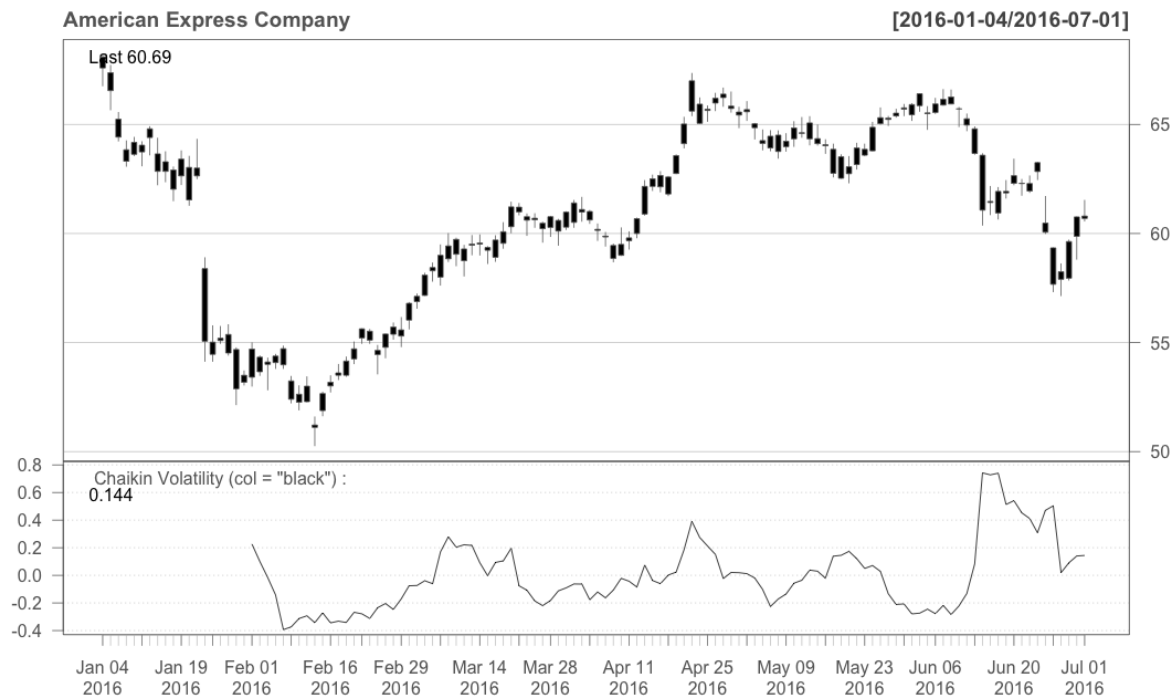


Figure 103 - American Express Company - Chaikin Volatility

Figure 104 shows the Average True Range (ATR) indicator for Visa Inc. As can be seen, the ATR peaked in February 2016, when the market became increasingly volatile due to unexpected selling; this indicated the next price bottom.



Figure 104 Visa Inc. - Average True Range (ATR)

Something similar occurred with MasterCard Inc., whose stock prices bottomed out in February 2016 (*Figure 105*). Furthermore, the period of low ATR, starting from March 2016, refers to the ranging market condition.



Figure 105 MasterCard Inc. - Average True Range (ATR)

The ATR of the American Express Company peaked in January 2016, a month before the stock prices of this company bottomed out (*Figure 105*). As there were no high price

fluctuations, the American Express Company might not be considered a good investment opportunity for a short-term investor seeking high-reward opportunities.



Figure 106 American Express Company - Average True Range (ATR)

Wilder (1978) points out that the Relative Strength Index (RSI) refers to the overbought signal when the indicator is above 70, whereas the oversold signal is considered when the indicator is below 30. Therefore, we look for these signals while observing our sample companies. According to this indicator, the stock of Visa Inc. became oversold in late January 2016, and soon after the stock price declined sharply (Figure 107). On the other hand, an overbought signal can be seen in the middle of April 2016.



Figure 107 Visa Inc. - Relative strength Index (RSI)

As can be seen in *Figure 108*, the stock of MasterCard Inc. became oversold in late January 2016, and around two weeks later a bottom evolved. Overbought signals were seen in late March and the middle of April 2016; after the second overbought signal the price peaked.



Figure 108 MasterCard Inc. - Relative strength Index (RSI)

Finally, the stock of the American Express Company can be considered as being oversold from January to the middle of February 2016 (*Figure 109*). This coincided with the price bottoming out during that period. The indicator then moved to overbought in April, and soon after the price peaked.



Figure 109 American Express Company - Relative strength Index (RSI)

As was noted in the methodology section, the advanced version of the RSI is the indicator called the Money Flow Index (MFI). Nevertheless, the interpretation of the MFI is more or less similar to the RSI, although the main difference is introducing volume. According to this indicator, the stock of Visa Inc. became overbought in late March and the middle of April 2016, whereas the stock became oversold only in late July 2016 (*Figure 110*).



Figure 110 Visa Inc. - Money Flow Index (MFI)

As can be seen in *Figure 111*, a particularly interesting moment in the case of MasterCard Inc. was when the MFI rose above 80 and became overbought in late March 2016, and then plunged below 80, failed to exceed that value again, and finally broke below the prior reaction low. On the other hand, the stock of this company reached a higher high in the middle of April. This indicates a bearish divergence, which is just another feature of the MFI indicator.



Figure 111 MasterCard Inc. - Money Flow Index (MFI)

Besides the overbought and oversold signals that occur when the MFI reaches over 80 and below 20, respectively, a bearish divergence is also noticeable in the case of the American Express Company (*Figure 112*). This occurred during the period between late February and the middle of March 2016, when the MFI formed a lower high, whereas the stock price reached a higher high.



Figure 112 American Express Company - Money Flow Index (MFI)

Figure 113 shows the Moving Average Convergence-Divergence (MACD) line in the example of Visa Inc. As can be seen, the MACD line was positive between March and the middle of May 2016, which means that the short-term exponential moving average (EMA) was above the longer-term EMA during that period. A situation like this suggests that the uptrend is getting stronger, and indicates an appropriate time to buy stock. Nevertheless, the indicator is currently negative, meaning that it might not be a good time for buying.

On the other hand, *Figure 113* also shows the signal line, the 9-day exponential moving average of the MACD line. There were two bullish signal line crossovers in late March and May 2016, while three bearish signal line crossovers occurred in March, April, and June of the same year.



Figure 113 Visa Inc. - Moving Average Convergence-Divergence (MACD) Line
The 12-day EMA and 26-day EMA are presented by blue and red line, respectively

As can be seen in Figure 114, according to the MACD line indicator an investor willing to invest in MasterCard Inc. had many good buying opportunities due to the fact that the MACD line of this company was positive for a long period between late February and June 2016. There were three bearish and one bullish signal line crossovers, not all of which were good signals. For instance, there was a bearish signal line crossover in early April 2016, while the stock of MasterCard Inc. continued a previously established uptrend.



Figure 114 MasterCard Inc. - Moving Average Convergence-Divergence (MACD) Line
The 12-day EMA and 26-day EMA are presented by blue and red line, respectively

After a considerable period in the negative zone, the MACD line of the American Express Company moved into the positive zone in late February 2016 (*Figure 115*). There were several bearish and bullish signal line crossovers; however, the bearish signal line crossover that occurred in early April 2016 might be considered incorrect, as the company's stock continued to go up.



Figure 115 American Express Company - Moving Average Convergence-Divergence (MACD) Line
The 12-day EMA and 26-day EMA are presented by blue and red line, respectively

As is believed by the majority of traders, the Stochastic Momentum Index (SMI) can be used for forecasting either bullish or bearish trend purposes in the market. An SMI of below 40 indicates a bearish trend, whereas an SMI of over 40 indicates a bullish trend. Therefore, we look for these extremes in our analysis. For instance, as can be seen in *Figure 116*, a bullish trend was correctly predicted by the SMI in late March 2016. Nonetheless, the traders should have known that a time for selling would occur soon, due to the fact that according to the SMI a sell signal is indicated when the indicator value is above 40.

Furthermore, both the signal line position and signal line crossovers are also significant; Blau (1993) notes that when the SMI is above its signal line, a price uptrend is indicated. Conversely, when the SMI is below its signal line, a downtrend is defined. Regarding the signal line crossovers, Yell (2013), a Forex trading instructor, argues that in order to prevent lower probability crossovers, a neutral zone at the levels of ± 15 should be added to the indicator. Consequently, after a crossover at either above or less than ± 40 , only if there is no new crossover in the proposed neutral zone should a trader reverse his position. Otherwise, the trade could easily become a big loss.



Figure 116 Visa Inc. - Stochastic Momentum Index (SMI)

The SMI presented in *Figure 117* indicated a bullish trend in the stock prices of MasterCard Inc. in March 2016. On the other hand, the signal line crossovers that occurred in early and late April 2016 provided the sell signals.



Figure 117 MasterCard Inc. - Stochastic Momentum Index (SMI)

As can be seen in *Figure 118*, according to the SMI, after a bearish trend in the stock prices of the American Express Company, a bullish trend was seen in early March 2016.

There were two sell signals in late March and April 2016, while a buy signal was observed in the middle of April 2016.



Figure 118 American Express Company - Stochastic Momentum Index (SMI)

Figure 119 shows the Rate of Change (ROC) indicator for Visa Inc. It is clear that as long as the ROC was positive the stock prices of this company were increasing, and vice versa. Obviously there was no upward limit in the value of this indicator, as the price could have gone up without any boundaries, although a downside boundary was present due to the fact that the minimum price of the stock could not be less than zero.



Figure 119 Visa Inc. - Rate of Change (ROC)

Figures 120 and 121 show the ROC for MasterCard Inc. and the American Express Company, respectively. In a nutshell, this indicator represents the percentage difference between the closing price today and the closing price, in this case, twelve periods ago.



Figure 120 MasterCard Inc. - Rate of Change (ROC)



Figure 121 American Express Company - Rate of Change (ROC)

Figure 122 shows the Know Sure Thing (KST) indicator for Visa Inc., the first company in our sample. Generally speaking, a positive KST indicated a bullish market, while a negative indicator referred to a bearish market. In other words, the meaning of a positive indicator was that the stock prices were rising, and vice versa. Interestingly, as can be seen in Figure 122, the KST was rising whenever it was above the signal line. Conversely, when the KST was below the signal line, the indicator was falling.



Figure 122 Visa Inc. - Know Sure Thing (KST)

The KST of MasterCard Inc. was continuously dropping, starting from April 2016. The indicator fell into the negative zone in late May 2016, indicating that the company's stock prices were moving lower (*Figure 123*).



Figure 123 MasterCard Inc. - Know Sure Thing (KST)

However, the fact that this indicator does not always work properly can be seen in the example of the American Express Company. For instance, as can be seen in *Figure 124*, a bearish KST divergence occurred during the period between March and April 2016; the stock prices of this company rose, despite the fact that the indicator kept falling. Moreover, the price movements were not confirmed by this indicator several more times during the observation period.



Figure 124 American Express Company - Know Sure Thing (KST)

All the oversold and overbought signals are indicated in Figure 125 in red and green colors, respectively. At the end of the observed period, the stocks of Visa Inc. are, according to the 14-day Williams %R indicator, considered to be overbought. As can be seen in the same figure, the stocks of Visa Inc. were overbought rather than oversold during the investigated period.

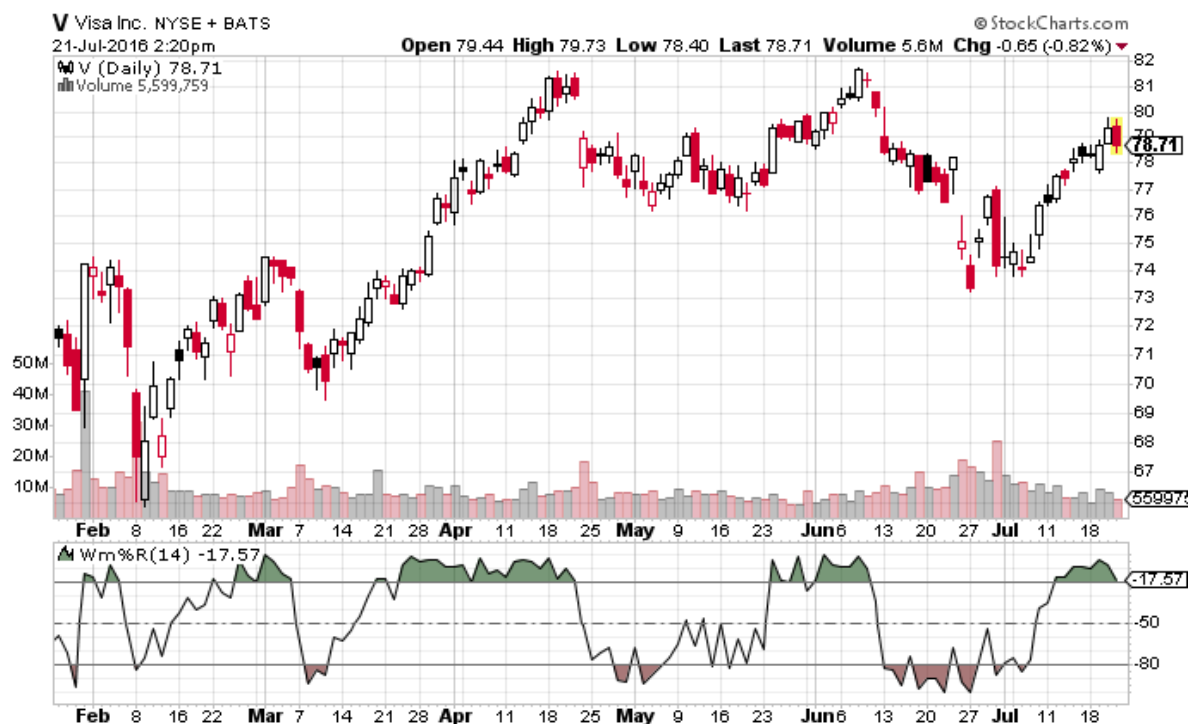


Figure 125 Visa Inc. - Williams %R
Source: StockCharts.com

According to this indicator, the stocks of MasterCard Inc. ended up being overbought in late July 2016, even though the stocks were considered to be oversold just a few weeks previously (*Figure 126*).

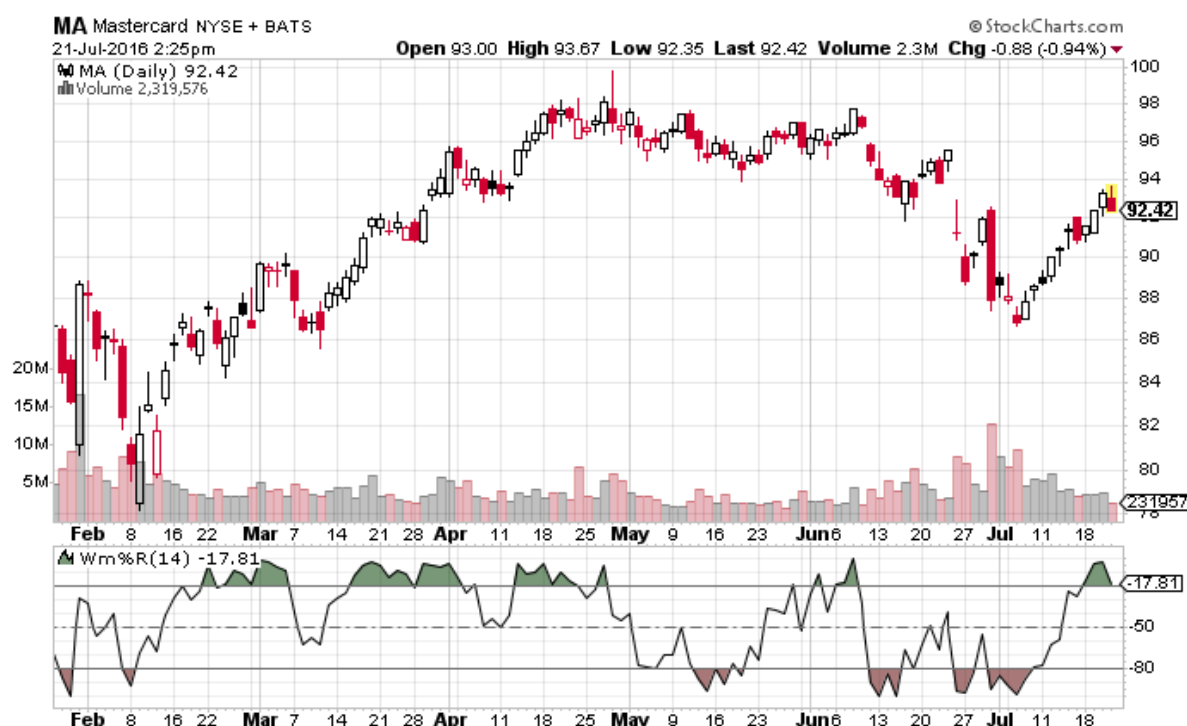


Figure 126 MasterCard Inc. - Williams %R
Source: StockCharts.com

However, the Williams %R itself is not such a perfect indicator due to the fact that momentum failures are quite often seen. For example, as can be seen in *Figure 127*, regardless of the long uptrend in the stock prices of the American Express Company, between February and late May 2016, the Williams %R was indicating overbought signals all the time; however, if a trader had sold the stocks at the first indication of an overbought signal, he would have missed a much better moment to sell and earn more money, which is after all the main objective of every trader.

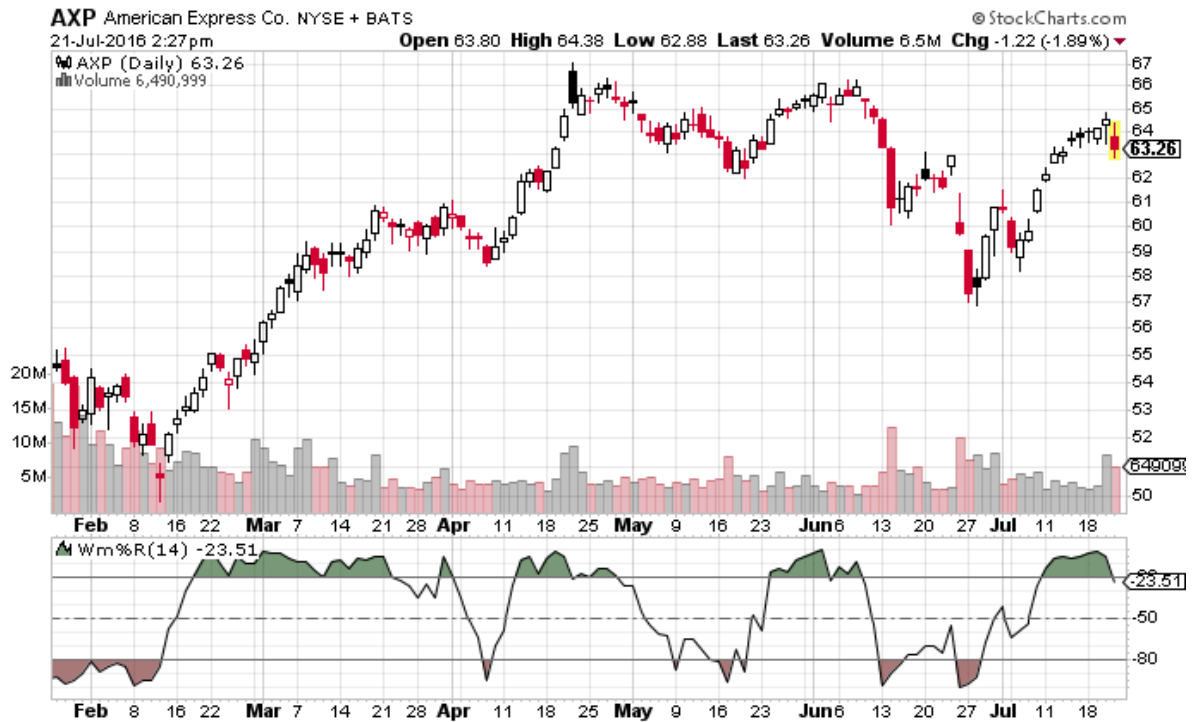


Figure 127 American Express Company - Williams %R
 Source: StockCharts.com

The last technical analysis indicator to be analyzed in this paper is the so-called Zero Lag indicator, which serves, as explained in the methodology section, to remove a selected amount of lag from an exponential moving average (EMA). *Figure 128* compares the error correcting (EC) and the EMA of Visa Inc. Generally speaking, as noted by Ehlers and Way (2015), when the EC is above the EMA the stock is in a bullish mode, and when the EC is below the EMA the stock is bearish. This is indeed more or less confirmed in the example of Visa Inc.



Figure 128 Visa Inc. - The error correcting (EC) and exponential moving average (EMA) comparison
The EC is presented by the red line, whereas the blue line shows the EMA

A comparison of the EC and EMA of MasterCard Inc. is shown in *Figure 129*. A bullish mode is mainly seen during the period between February and April 2016, although a bearish mode prevailed thereafter.



Figure 129 MasterCard Inc. - The error correcting (EC) and exponential moving average (EMA) comparison
The EC is presented by the red line, whereas the blue line shows the EMA

After a sharp decline in the stock prices of the American Express Company in January 2016, a bull market was indicated both by the EC and the stock price movements; the same uptrend lasted until late April of the same year (*Figure 130*).



Figure 130 American Express Company - The error correcting (EC) and exponential moving average (EMA) comparison
The EC is presented by the red line, whereas the blue line shows the EMA

Conclusions

After a successful financial statement analysis, conclusions in the context of the interests of all the relevant stakeholders of the observed companies can be made. Starting with the shareholders, as shown in *Figure 1*, the most significant aspect of business for them is profitability (return on equity) and the company's dividend policy. According to the return on equity indicator (*Figure 8*), MasterCard Inc. was the most profitable company within our sample during the period 2012 to 2015. However, the American Express Company shareholders received more money in the form of dividends than the other companies' shareholders (*Figure 36*).

As is known from his letters, Warren Buffet is not a big supporter of dividends, as the dividend payout often limits a company's growth and prevents its stock prices from rising. However, as was shown earlier in this paper, American Express Company has been actively paying dividends to its shareholders. More precisely, it has been paying much higher dividends than comparable companies. On the other hand, this company has suffered difficulties in recent years and hence has faced a big fall in its stock prices (about a third of their value over the last year). Therefore, an interesting proposal for future research might be an investigation into American Express Company's dividend policy of and whether it needs a radical change.

The most important feature for the government is whether a company pays tax regularly. It can be stated that the government is only satisfied with American Express

Company, as it paid the effective tax rate of 20.16% (the closest to the corporate nominal tax rate in the US) in 2015, whereas the comparable group companies paid far less.

Bankers are interested in the interest coverage ratio, as it tells them how much of a company's earnings are available for interest payments. American Express Company had the lowest ratio in 2015 (*Figure 35*).

Suppliers are concerned with a firm's liquidity. The most liquid company according to all the observed indicators was MasterCard Inc. during the period 2012 to 2015.

Buyers want to know the level of their bargaining power. As explained in Porter's five forces analysis, buyers' bargaining power over the observed companies is quite low, as there are a lot of buyers on the market and only a few suppliers.

Finally, the feature that connects the interests of all the relevant stakeholders is related to credit risk; more precisely, the implied bankruptcy probability, as estimated by using a Z score model. The highest implied probability of going bankrupt within a two-year period is estimated for American Express Company (*Figure 29*).

As for the corporate valuation analyses, provided in the second part of this paper, our estimated price of Visa Inc. was \$88.86 per share, while the projected market capitalization accounted for \$192 billion.

The price of MasterCard Inc. was estimated to be \$115 per share, while we projected the market capitalization to be \$127 billion. The estimated American Express' price was \$75.89 per share; on the other hand, we projected the market capitalization to be \$72.0 billion.

In the third part of this paper we presented some of the most commonly used technical analysis indicators by traders nowadays. As was seen, most of the technical analysis indicators have both advantages and disadvantages; they work properly under specific circumstances and indeed indicate a buy or a sell signal.

In order to find the most suitable and still useful tools, we provided a back-test analysis for the various technical analysis indicators for each and every sample company for the period between January 2016 and July 2016.

As for the trend analysis, the moving averages were taken into consideration first, which proved to be very useful, and therefore always highly recommended for traders. The Aroon Oscillator showed that whether a downtrend or an uptrend is underway can still be found, but forecasting the exact duration of that trend is hardly achievable. Furthermore, the accumulation-distribution line, whose purpose is to confirm the trend of a security, was also seen as a reliable indicator; nevertheless, we recommend an extra caution in case of trading for a very short period of time.

The traders of the all sample companies should go short according to the Chaikin Money Flow indicator. It is questionable, however, what would be if the all market participants do the same thing?

The On Balance Volume indicator proved not to be so useful in our analysis, as a divergence and its other significant features were not seen in any of the sample companies, due to the fact that the price movement was always confirmed by the indicator.

The Average True Range indicator provided two important things. First, it indicated the price bottoms in stock prices of the sample companies. Second, it referred to the American Express company as a bad investment opportunity for a short-term investor seeking high-reward opportunities.

The Relative Strength Index worked well in the previous analysis, as it always referred to the overbought and oversold signals. For instance, as was seen in the results and discussion section, the stock of Visa Inc. became oversold in late January 2016, and soon after the stock price declined sharply. On the other hand, after the second overbought signal in the middle of April 2016 the price of MasterCard Inc. peaked. However, we recommend the use of the Money Flow Index, which is indeed an advanced version of the Relative Strength Index.

The Moving Average Convergence-Divergence line showed whether there was a good time for buying. For example, according to this indicator, an investor willing to invest in MasterCard Inc. had many good buying opportunities between late February and June 2016. Nevertheless, the indicator provided several misleading signals, which could have cost a trader, who used it, a considerable amount of money.

The Stochastic Momentum Index (SMI) in accordance with the signal line crossovers proved to be a reliable indicator. The SMI itself indicated the bullish or bearish trend, whereas the signal line crossovers showed the right moment to stop following the trend.

The real failure of the Know Sure Thing indicator was seen in the example of the American Express Company. Consequently, we consider it as an obsolete and highly misleading indicator.

As was shown in the results and discussion section, the Williams %R is also not such a perfect indicator, due to the fact that momentum failures are quite often seen.

Finally, we recommend the Zero Lag indicator, as its effectiveness was seen in the back-test analysis.

Trading based on technical analysis is suitable only in the short term, as a long-term investment requires a much more in-depth observation of a company and the market it is operating in. Regardless of the critics of technical analysis, most indicators proved to be reliable when used by a privileged few traders. As soon as an indicator reaches other investors it fails to provide reliable and precise signals. In other words, it is impossible for everyone to be a winner on the market; some traders must also lose.

There will be always new technical analysis indicators; the only question that arises is when traders should use them, at the very beginning, when they are effective, or by the time everyone has started using them. After all, as Fenton-O'Creevy et al. (2005) point out, traders both get lucky and make mistakes.

Notes

¹For more information, see: <http://www.edgar-online.com/overview.aspx>

²For more information about E. I. Altman, see: <http://people.stern.nyu.edu/ealtman/>

³The working capital is calculated in the following way:

$$\begin{aligned} \text{Working Capital} = & \text{Total Current Assets} - \text{Cash \& Equivalents} - \text{Total Current Liabilities} \\ & + \text{Notes Payable/Short Term Debt} + \text{Current Port. of LT Debt/Capital Leases} \end{aligned}$$

⁴BVEquity means book value equity.

⁵SWOT refers to Strengths, Weaknesses, Opportunities, and Threats.

⁶For more information about Michael E. Porter, see: <http://www.hbs.edu/faculty/Pages/profile.aspx?facId=6532>

⁷For more information, see: <http://www.trefis.com>

⁸For more information about the Quantmod package, see: <https://cran.r-project.org/web/packages/quantmod/quantmod.pdf>

⁹For more information about the TTR package, see: <https://cran.r-project.org/web/packages/TTR/index.html>

¹⁰For more information, see: <http://pring.com>

¹¹For more information about John Ehlers and Ric Way, see: http://www.mesasoftware.com/about_mesa_ehlers.htm

¹²See *Figure 19*.

¹³For more information, see: https://newsroom.MasterCard.com/wp-content/uploads/2013/09/MasterStory_Key_Payment_terms_091113.pdf

¹⁴In this particular case, a company's investors include both stockholders and bondholders.

¹⁵For more information, visit: <https://www.irs.gov/>

¹⁶See Financial Times (2014)

¹⁷For more information, see: <https://www.plastiq.com>

¹⁸For more information, see: <http://www.planetpayment.com>

Literature

Alhabeeb, M. J. (2012) *Mathematical Finance*. [Online]. Hoboken, NJ, USA: John Wiley & Sons, Inc.

- Altman, E. I. (1968) Financial Ratios, Discriminant Analysis and The Prediction of Corporate Bankruptcy. *The Journal of Finance*. [Online] 23 (4), 589–609. [online]. Available from: <http://doi.wiley.com/10.1111/j.1540-6261.1968.tb00843.x> (Accessed 31 March 2015).
- Altman, E. I. (2002) *Revisiting Credit Scoring Models in a Basel 2 Environment*. [online]. Available from: <http://papers.ssrn.com/abstract=1295815>. [online]. Available from: <http://papers.ssrn.com/abstract=1295815>.
- American Express Company (2015) *Annual Report*.
- Andrews (1968) *Financial Management; Principles and Practice*. FreeLoad Press, Inc. [online]. Available from: <https://books.google.com/books?id=sSzpPWDSapoC&pgis=1> (Accessed 4 June 2015).
- Anon (2016) *CSIMarket.com* [online]. Available from: <http://csimarket.com/index.php>.
- Arditti, F. D. (1973) The Weighted Average Cost of Capital: Some Questions on Its Definition, Interpretation, and Use. *The Journal of Finance*. [Online] 28 (4), 1001–1007. [online]. Available from: <http://doi.wiley.com/10.1111/j.1540-6261.1973.tb01422.x>.
- Arditti, F. D. & Levy, H. (1977) The Weighted Average Cost of Capital as a Cutoff Rate: A Critical Analysis of the Classical Textbook Weighted Average. *Financial Management*. [Online] 6 (3), 24–34. [online]. Available from: <http://doi.wiley.com/10.2307/3665253>.
- Bagwell, S. L. & Shoven, J. B. (1989) Cash Distributions to Shareholders. *The Journal of Economic Perspectives*. 3 (3), 129–140. [online]. Available from: http://www.jstor.org/stable/1942765?seq=1#page_scan_tab_contents.
- Bergsten, E. E. (1966) Credit Cards--A Prelude to the Cashless Society. *Boston College Industrial and Commercial Law Review*. 8 (3), 485. [online]. Available from: <http://heinonline.org/HOL/Page?handle=hein.journals/bclr8&id=491&div=&collection=>.
- Blau, W. (1993) Stochastic Momentum. *Technical Analysis of Stocks and Commodities*. 11 (1), 26–32. [online]. Available from: <http://technical.traders.com/archive/archivelogin.asp?file=\\V11\\C01\\STOCHAS.pdf&src=SC>.
- Bloomberg (2015) *Visa Agrees to Buy Visa Europe for as Much as \$23.4 Billion* [online]. Available from: <http://www.bloomberg.com/news/articles/2015-11-02/visa-agrees-to-buy-visa-europe-for-as-much-as-23-4-billion>.
- Brealey, R. A. et al. (2007) *Fundamentals of Corporate Finance*. McGraw-Hill/Irwin. [online]. Available from: <https://books.google.com/books?id=3X2pPwAACAAJ&pgis=1> (Accessed 3 June 2015).
- Brick, J. R. & Thompson, H. E. (1978) The Economic Life of an Investment and the Appropriate Discount Rate. *The Journal of Financial and Quantitative Analysis*. [Online] 13 (5), 831–846. [online]. Available from:

<http://www.jstor.org/stable/2330630?origin=crossref>.

Brigham, E. F. (1979) *Financial Management: Theory & Practice*. Atlantic Publishers & Distri. [online]. Available from: <https://books.google.com/books?id=wLix9OceP3MC&pgis=1>.

Brock, W. et al. (1992) Simple Technical Trading Rules and the Stochastic Properties of Stock Returns. *The Journal of Finance*. [Online] 47 (5), 1731–1764. [online]. Available from: <http://doi.wiley.com/10.1111/j.1540-6261.1992.tb04681.x>.

Buffett, W. E. (1997) *Chairman's Letter*. [online]. Available from: <http://www.berkshirehathaway.com/letters/1996.html>. [online]. Available from: <http://www.berkshirehathaway.com/letters/1996.html>.

Business Insider (2016) *MasterCard breaks into cross-border tuition* [online]. Available from: <http://www.businessinsider.com/MasterCard-breaks-into-cross-border-tuition-2016-8>.

China UnionPay (2016) *Overview* [online]. Available from: http://en.unionpay.com/comInstr/aboutUs/file_4912292.html.

Copeland, T. et al. (1990) *Valuation: measuring and managing the value of companies*. New York: John Wiley & Sons, Inc.

Cornell, B. & Cheng, S. (1995) *Using the DCF Approach to Analyze Cross-sectional Variation in Expected Returns*. [online]. Available from: <http://eprints.cdlib.org/uc/item/43w3m848>. [online]. Available from: <http://eprints.cdlib.org/uc/item/43w3m848>.

Costa Storti, C. & De Grauwe, P. (2001) *Monetary Policy in a Cashless Society*. [online]. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=261872. [online]. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=261872.

Dempsey, M. (2013) The Capital Asset Pricing Model (CAPM): The History of a Failed Revolutionary Idea in Finance? *Abacus*. [Online] 49 (SUPPL.1), 7–23.

Detry, P. J. & Gregoire, P. (2001) 'Other Evidences of the Predictive Power of Technical Analysis: The Moving Averages Rules on European Indexes', in *EFMA 2001 Lugano Meetings*. [Online]. 2001 p. 25. [online]. Available from: <http://www.ssrn.com/abstract=269802> (Accessed 28 June 2016).

Dorsey, P. (2011) *The Five Rules for Successful Stock Investing: Morningstar's Guide to Building Wealth and Winning in the Market*. John Wiley & Sons. [online]. Available from: https://books.google.com/books?id=Zo86MS_IDCAC&pgis=1 (Accessed 3 June 2015).

Downey, C. M. (1996) High Price of a Cashless Society: Exchanging Privacy Rights for Digital Cash? *John Marshall Journal of Computer and Information Law*. 14 (2), 303. [online]. Available from: <http://heinonline.org/HOL/Page?handle=hein.journals/jmjcila14&id=307&div=&collect>

ion=.

- Durbin, D. (2010) *Durbin Statement On His Debit Card Swipe Fee Amendment*. [online]. Available from: <http://www.durbin.senate.gov/newsroom/press-releases/durbin-statement-on-his-debit-card-swipe-fee-amendment>. [online]. Available from: <http://www.durbin.senate.gov/newsroom/press-releases/durbin-statement-on-his-debit-card-swipe-fee-amendment>.
- Edwards, R. D. et al. (2007) *Technical Analysis of Stock Trends*. 9th edition. Taylor & Francis Group, LLC. [online]. Available from: <https://books.google.co.uk/books?hl=en&lr=&id=wklriRw9a1oC&oi=fnd&pg=PP1&dq=Technical+Analysis+of+Stock+Trends+&ots=MVXMUKAT05&sig=z5GEtf7uNJijAYsADoi6USrkOO8#v=onepage&q=Technical+Analysis+of+Stock+Trends&f=false>.
- Ehlers, J. & Way, R. (2015) *ZeroLag*. [online]. Available from: <http://www.mesasoftware.com/papers/ZeroLag.pdf>. [online]. Available from: <http://www.mesasoftware.com/papers/ZeroLag.pdf>.
- EMarketer (2015) *Nearly one in five smartphone users will use mobile payments by next year*
- Federal Government of the United States of America (2009) *Credit Card Accountability Responsibility and Disclosure Act of 2009*.
- Feldstein, M. et al. (1983) The effective tax rate and the pretax rate of return. *Journal of Public Economics*. [Online] 21 (2), 129–158. [online]. Available from: <http://www.sciencedirect.com/science/article/pii/0047272783900476> (Accessed 5 June 2015).
- Fenton-O’Creevy, M. et al. (2005) *Traders - Risk, Decisions, and Management in Financial Markets*. New York: Oxford University Press.
- Fernandez, P. (2014a) CAPM: an absurd model. *SSRN Electronic Journal*. [online]. Available from: <https://valueplan.files.wordpress.com/2014/10/capm-an-absurd-model.pdf>.
- Fernandez, P. (2014b) CAPM: the model and 233 comments about it. *SSRN Electronic Journal*. [online]. Available from: <http://www.valuewalk.com/wp-content/uploads/2014/12/SSRN-id2523870.pdf>.
- Fernandez, P. & Bermejo, V. (2015) Beta = 1 does a better job than calculated betas. *SSRN Electronic Journal*. [online]. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1406923&download=yes.
- Financial Times (2015) *China opens door for Visa and MasterCard to challenge UnionPay*. 31 May. [online]. Available from: <https://www.ft.com/content/6a71b148-0764-11e5-a58f-00144feabdc0>.
- Financial Times (2013) *Visa Europe bows to EU fees pressure*. 14 May. [online]. Available from: <https://www.ft.com/content/7d56931e-bcac-11e2-9519-00144feab7de>.

- Fortune (2015) *Change the World*. [online]. Available from: <http://fortune.com/change-the-world/>. [online]. Available from: <http://fortune.com/change-the-world/>.
- Fox, K. H. (1980) Another Step Toward the Cashless Society? The 1978 Federal Electronic Fund Transfer Act. *American Business Law Journal*. [Online] 18 (2), 209–224. [online]. Available from: <http://doi.wiley.com/10.1111/j.1744-1714.1980.tb00041.x>.
- Frykman, D. & Tolleryd, J. (2003) *Corporate Valuation: an easy guide to measuring value*. Edinburgh: Pearson Education Limited.
- Getter, D. E. (2011) *Regulation of Debit Interchange Fees*. [online]. Available from: <https://www.fas.org/sgp/crs/misc/R41913.pdf>. [online]. Available from: <https://www.fas.org/sgp/crs/misc/R41913.pdf>.
- Gildersleeve, R. (1999) *Winning Business: How to Use Financial Analysis and Benchmarks to Outscore Your Competition, Volume 1*. Gulf Professional Publishing. [online]. Available from: <https://books.google.com/books?id=RspmTt-WnpgC&pgis=1> (Accessed 3 June 2015).
- Hay, G. & Castilla, G. (2006) ‘Object-based image analysis: strengths, weaknesses, opportunities and threats (SWOT)’, in *Proc. 1st Int. Conf. OBIA*. 2006 [online]. Available from: http://www.isprs.org/proceedings/xxxvi/4-c42/Papers/OBIA2006_Hay_Castilla.pdf.
- Hehn, K. & Poulsen, A. (1989) Free Cash Flow and Stockholder Gains in Going Private Transactions. *The Journal of Finance*. [Online] 44 (3), 771–787. [online]. Available from: <http://doi.wiley.com/10.1111/j.1540-6261.1989.tb04390.x>.
- Hill, T. & Westbrook, R. (1997) SWOT analysis: It’s time for a product recall. *Long Range Planning*. [Online] 30 (1), 46–52. [online]. Available from: <http://www.sciencedirect.com/science/article/pii/S0024630196000957>.
- International Monetary Fund (2016) *World Economic Outlook Update*. [online]. Available from: <http://www.imf.org/external/pubs/ft/weo/2016/update/01/pdf/0116.pdf>. [online]. Available from: <http://www.imf.org/external/pubs/ft/weo/2016/update/01/pdf/0116.pdf>.
- Investopedia (2016a) *Relative Strength Index - RSI*
- Investopedia (2016b) *Research and Development (R&D) Expenses*
- Investopedia (2014) *What’s the difference between moving average and weighted moving average?*
- Kirkpatrick II, C. D. & Dahlquist, J. A. (2013) *Technical Analysis: The Complete Resource for Financial Market Technicians*. Second. New Jersey: Pearson Education, Inc.
- Knezevic, G. et al. (2013) *Analiza finansijskih izveštaja*. Univerzitet Singidunum. [online]. Available from: <https://books.google.com/books?hl=en&lr=&id=9SpHAgAAQBAJ&pgis=1> (Accessed 31 May 2015).

- Koen, M. & Oberholster, J. (1999) *Analysis and Interpretation of Financial Statements*. Juta and Company Ltd. [online]. Available from: <https://books.google.com/books?id=Ul3ldOyr73QC&pgis=1> (Accessed 5 June 2015).
- Lawrence, B. et al. (1994) Market Statistics and Technical Analysis: The Role of Volume. *The Journal of Finance*. [Online] 49 (1), 153–181. [online]. Available from: <http://doi.wiley.com/10.1111/j.1540-6261.1994.tb04424.x>.
- Lewis, J. (1908) *Remark to a neighbor*.
- Mankiw, N. G. & Taylor, M. P. (2006) *Economics*. [online]. Available from: https://books.google.rs/books/about/Economics.html?id=C0me_egxxDcC&pgis=1 (Accessed 31 May 2015).
- MasterCard Inc. (2016) *Glossary*
- MasterCard Inc. (2015) *MasterCard Annual Report*.
- Merton, R. C. (1973) An Intertemporal Capital Asset Pricing Model. *Econometrica*. 41 (5), 867–887.
- Miles, J. A. & Ezzell, J. R. (1980) The Weighted Average Cost of Capital, Perfect Capital Markets, and Project Life: A Clarification. *The Journal of Financial and Quantitative Analysis*. [Online] 15 (3), 719. [online]. Available from: <http://www.jstor.org/stable/2330405?origin=crossref>.
- Moosa, I. (2013) The capital asset pricing model (CAPM): the history of a failed revolutionary idea in finance? Comments and extensions. *Abacus*. [online]. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1467-6281.2012.00385.x/full> (Accessed 19 December 2015).
- Morck, R. & Bernard, Y. (2005) Dividend Taxation and Corporate Governance. *The Journal of Economic Perspectives*. 19 (3), 163–180.
- Mullins Jr, D. W. (1992) Does the Capital Asset Pricing Model Work? Harvard Business Review [online]. Available from: <https://hbr.org/1982/01/does-the-capital-asset-pricing-model-work>. [online]. Available from: <https://hbr.org/1982/01/does-the-capital-asset-pricing-model-work>.
- Myers, S. C. (1974) Interactions of Corporate Financing and Investment Decisions-Implications for Capital Budgeting. *The Journal of Finance*. [Online] 29 (1), 1–25. [online]. Available from: <http://doi.wiley.com/10.1111/j.1540-6261.1974.tb00021.x>.
- Pickton, D. W. & Wright, S. (1998) What's swot in strategic analysis? *Strategic Change*. [Online] 7 (2), 101–109. [online]. Available from: <http://doi.wiley.com/10.1002/%28SICI%291099-1697%28199803/04%297%3A2%3C101%3A%3AAID-JSC332%3E3.0.CO%3B2-6>.
- Platt, H. D. et al. (1995) Sustainable growth rate of firms in financial distress. *Journal of Economics and Finance*. [Online] 19 (2), 147–151. [online]. Available from:

<http://link.springer.com/10.1007/BF02920515>.

- Porter, M. E. (1979) How Competitive Forces Shape Strategy. *Harvard Business Review*. 137–145. [online]. Available from: <http://faculty.bcitbusiness.ca/KevinW/4800/porter79.pdf>.
- Poterba, J. M. & Summers, L. H. (1984) *The Economic Effects of Dividend Taxation*. [online]. Available from: <http://www.nber.org/papers/w1353>. [online]. Available from: <http://www.nber.org/papers/w1353>.
- Pring, M. J. (1992a) Rate of Change. *Technical Analysis of Stocks and Commodities*. 10 (8), 325–327.
- Pring, M. J. (1992b) Summed Rate Of Change (KST). *Technical Analysis of Stocks and Commodities*. 10 (9), 365–369. [online]. Available from: <ftp://80.240.216.180/Transmission/Файлы/S&C11.26/VOLUMES/V10/C09/SUMMED.PDF> on DVD
- Quong, G. & Soudack, A. (1989) Volume-weighted RSI: money flow by Gene Quong and Avrum Soudack. *Technical Analysis of Stocks and Commodities*. 7 (3), . [online]. Available from: <http://technical.traders.com/archive/archivelogin.asp?file=%5CV07%5CC03%5CVOLU MEW.pdf&src=SC>.
- Reilly, R. R. & Wecker, W. E. (1973) On the Weighted Average Cost of Capital. *The Journal of Financial and Quantitative Analysis*. [Online] 8 (1), 123. [online]. Available from: <http://www.jstor.org/stable/2329754?origin=crossref>.
- Reuters (2016a) *China opens its markets to foreign bank card companies*. 7 June. [online]. Available from: <http://www.reuters.com/article/us-china-regulations-idUSKCN0YT1EB>.
- Reuters (2016b) *Visa, MasterCard \$7.25 billion settlement with retailers is thrown out* [online]. Available from: <http://www.reuters.com/article/us-visa-MasterCard-settlement-idUSKCN0ZG21E>.
- Ricardo, D. (1817) *The Principles of Political Economy and Taxation*. [online]. Available from: https://books.google.rs/books/about/The_Principles_of_Political_Economy_and.html?id=9_LDAAQAQBAJ&pgis=1.
- Saunders, A. & Cornett, M. M. (2014) *Financial Institutions Management: A Risk Management Approach*. McGraw-Hill Education. [online]. Available from: <https://books.google.com/books?id=O-nNjwEACAAJ&pgis=1> (Accessed 21 February 2016).
- Sharpe, W. (1964) Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance*. [Online] 19 (3), 425–442. [online]. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1540-6261.1964.tb02865.x/full>.

- Sharpe, W. (1970) *Portfolio Theory and Capital Markets*. New York: McGraw-Hill. [online]. Available from: https://scholar.google.com/scholar?q=Portfolio+Theoryand+Capital+Markets&btnG=&hl=en&as_sdt=0%2C5#0 (Accessed 18 December 2015).
- Smith, A. (1776) *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: W. Strahan. [online]. Available from: <http://books.google.bg/books?id=C5dNAAAACAAJ&pg=PP7#v=onepage&q&f=true> (Accessed 3 June 2015).
- Soliman, M. (2008) The use of DuPont analysis by market participants. *The Accounting Review*. [Online] 83 (3), 823–853. [online]. Available from: <http://www.aaajournals.org/doi/abs/10.2308/accr.2008.83.3.823>.
- Soliman, M. (2004) Using industry-adjusted DuPont analysis to predict future profitability. Available at SSRN 456700. [online]. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=456700 (Accessed 2 June 2015).
- Stanišić, N. (2013) Financial statement analysis - Hotel Moscow a.d. Belgrade 2012 - example. *SSRN Electronic Journal*. [online]. Available from: https://www.researchgate.net/publication/257132543_Analiza_finansijskih_izvestaja_Financial_Statement_Analysis.
- Stanišić, N. (2015) *Interests of All Relevant Stakeholders*.
- Stanišić, N. & Knežević, G. (2014) 'Break Even: Just Another Academic Amusement or Useful Addition to the Financial Practitioner's Toolbox', in *Finiz conference, Belgrade*. 2014 [online]. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2538724.
- StockCharts (2016) *On Balance Volume (OBV)* [online]. Available from: http://stockcharts.com/school/doku.php?id=chart_school:technical_indicators:on_balance_volume_obv.
- The Economist (2003) *Going with the flow*. 5 September. [online]. Available from: <http://www.economist.com/node/2048076>.
- Trading Economics (2016) *United States Corporate Tax Rate* [online]. Available from: <http://www.tradingeconomics.com/united-states/corporate-tax-rate>.
- Trefis (2016a) *ANALYSIS for NYSE : AXP*.
- Trefis (2016b) *ANALYSIS for NYSE : MA*.
- Trefis (2016c) *Analysis for NYSE:V*.
- TrendForce (2016) *TrendForce Says Global Mobile Payment Market to Reach US\$620 Billion in 2016 with Apple and Samsung Staking Large Claims in the Ecosystem* [online]. Available from: <http://press.trendforce.com/press/20160201-2298.html>.

- Veskovic, N. (2016) Financial Analysis of Serbian Companies Undergoing Privatization. *The European Journal of Applied Economics*. [Online] 13 (1), 24–35. [online]. Available from: <http://journal.singidunum.ac.rs/files/2016-13-1/financial-analysis-of-serbian-companies-undergoing-privatization.pdf>.
- Veskovic, N. (2015) *Financial Statement Analysis: Imlek Inc, Mlekara Subotica Inc and Somboled Ltd*. [Online]. Singidunum University. [online]. Available from: https://www.researchgate.net/publication/286556892_Analiza_finansijskih_izvestaja_I_mlek_AD_Mlekara_Subotica_AD_i_Somboled_doo.
- Visa Inc. (2015) *Annual Report*. [online]. Available from: http://s1.q4cdn.com/050606653/files/doc_financials/annual/VISA-2015-Annual-Report.pdf. [online]. Available from: http://s1.q4cdn.com/050606653/files/doc_financials/annual/VISA-2015-Annual-Report.pdf.
- Wahlen, J. M. et al. (2010) *Financial Reporting, Financial Statement Analysis and Valuation: A Strategic Perspective*. Cengage Learning. [online]. Available from: <https://books.google.com/books?id=JdsOg4f6ywEC&pgis=1> (Accessed 25 May 2016).
- Welch, I. & Levi, Y. (2014) Long-Term Capital Budgeting. *SSRN Electronic Journal*. [Online] [online]. Available from: <http://papers.ssrn.com/abstract=2327807>.
- Wilder, W. J. (1978) *New Concepts in Technical Trading Systems*. Trend Research.
- Worthington, S. (1995) The cashless society. *International Journal of Retail & Distribution Management*. [Online] 23 (7), 31–40. [online]. Available from: <http://www.emeraldinsight.com/doi/abs/10.1108/09590559510095260>.
- Yahoo Finance (2015) *AmEx adds perks to popular charge card, but increases fee*
- Yell, T. (2013) *Trading the Powerful Stochastic Momentum Index* [online]. Available from: https://www.dailyfx.com/forex/education/trading_tips/daily_trading_lesson/2013/04/11/StochasticMomentumIndex.html.
- Yue, T. & Hoven, M. (2015) Yes , CAPM Is Dead. *International Journal of Businees*. 20 (2), .
- Zivot, E. & Wang, J. (2006) *Modelling Financial Time Series with S-PLUS*. Second. [Online]. Springer-Verlag New York.