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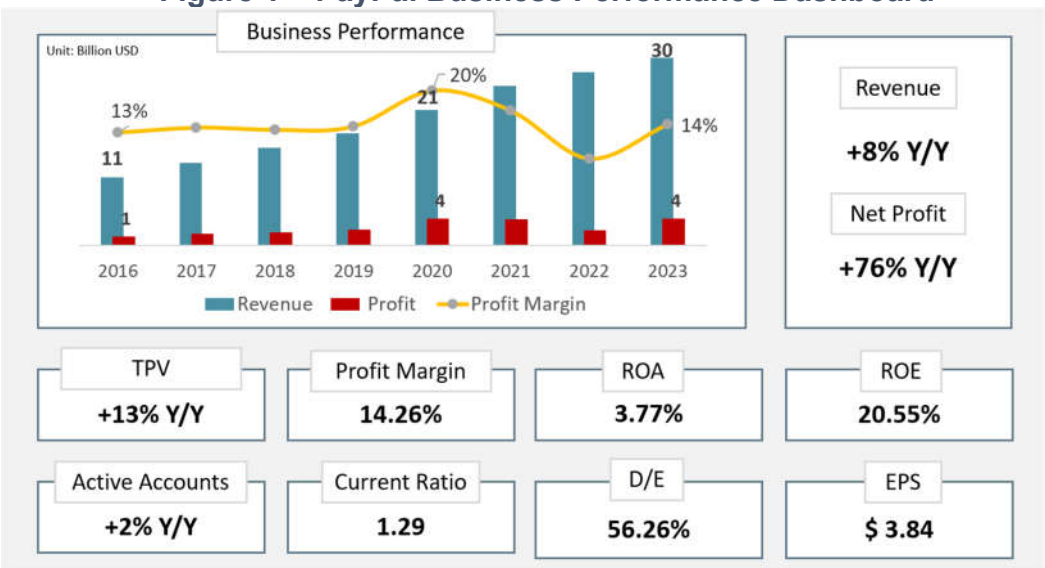
1. INTRODUCTION

During the COVID-19 pandemic, PayPal emerged as an innovative solution and resilience for online payments as it offered consumers and businesses a reliable and convenient payment solution (S&P Global, 2020). However, the game has changed and the once-rising star is facing significant obstacles (Nasdaq, 2022; CNBC, 2023). Recent reports indicate a notable downturn in PayPal's stock value, implying concerns among investors and stakeholders about fierce competition and disruptive innovation in the fintech industry (Garner, 2023). Amid escalating competition, PayPal needs to comprehensively reevaluate its fintech strategies to protect its leading position.

This report delves into an in-depth analysis of PayPal's fintech strategy, exploring its financial performance, M&A activities, current challenges, and prospects. Furthermore, the report identifies key threats and gaps in PayPal's current strategy, notably in its digital wallet and payment processing segments. Fierce competition from tech giants and traditional financial institutions, coupled with evolving consumer preferences, underscores the imperative for PayPal to innovate and adapt. In response to these challenges, the report also offers strategic recommendations for PayPal to secure its position as a leading player in the industry.

2. FINANCIALS

Figure 1 – PayPal Business Performance Dashboard

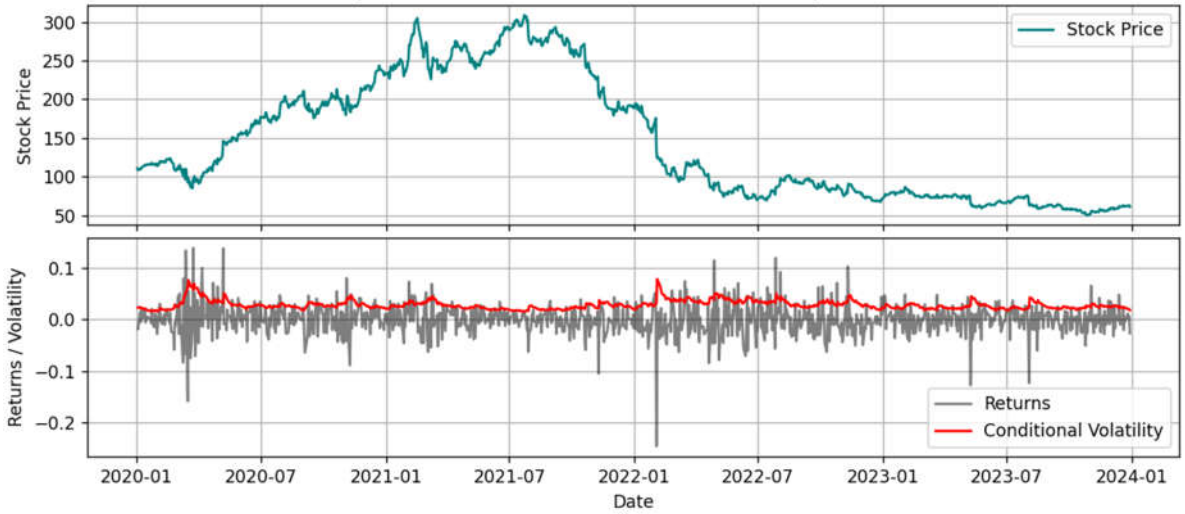


Source: Compiled by author using Power BI

Figure 1 depicts PayPal's 2023 performance, highlighting its healthy and strong financial position of PayPal. To enhance profitability, PayPal implemented the cost-cutting strategy in 2023, particularly in research and development (R&D) by 9%YoY and selling and general (S&G) by 11% YoY. Although this increases short-term profitability metrics, they may have long-term implications, especially for digital firms (Govindarajan, 2019).

Moreover, the surge was not driven by organic growth as a result of a decline in the operating profit ratio by more than 4% YoY. This downward trend is mainly driven by a 17% YoY increase in the cost of sales, which is a concerning signal about sustainable future growth (Evmenchik, 2021). Also, while formerly experiencing double-digit growth, PayPal revenue only increased by 8% in 2023. Besides, the fact that the number of active accounts increased by only 2% also underscored fierce competition (PYMNTS, 2024).

Figure 2 – Stock Return Volatility using EGARCH



Source: Graph by author (Appendix 1)

Graph 2 illustrates the persistent stock fluctuations via EGARCH model, which highlights PayPal's inherent volatility, suggesting ongoing uncertainty in its market performance. Indeed, while PayPal maintains robust financial health, the stock performance of PayPal performed poorly in 2023, which was just one-fourth from its peak in mid-2021 (Nasdaq, 2023).

Moreover, the concern surrounding PayPal's stock performance is displayed by its lower P/E ratio compared to industry peers (Appendix 2). This discrepancy reflects investor pessimism regarding PayPal's future growth prospects and the competitiveness of payment services sector (Yahoo Finance, 2023).

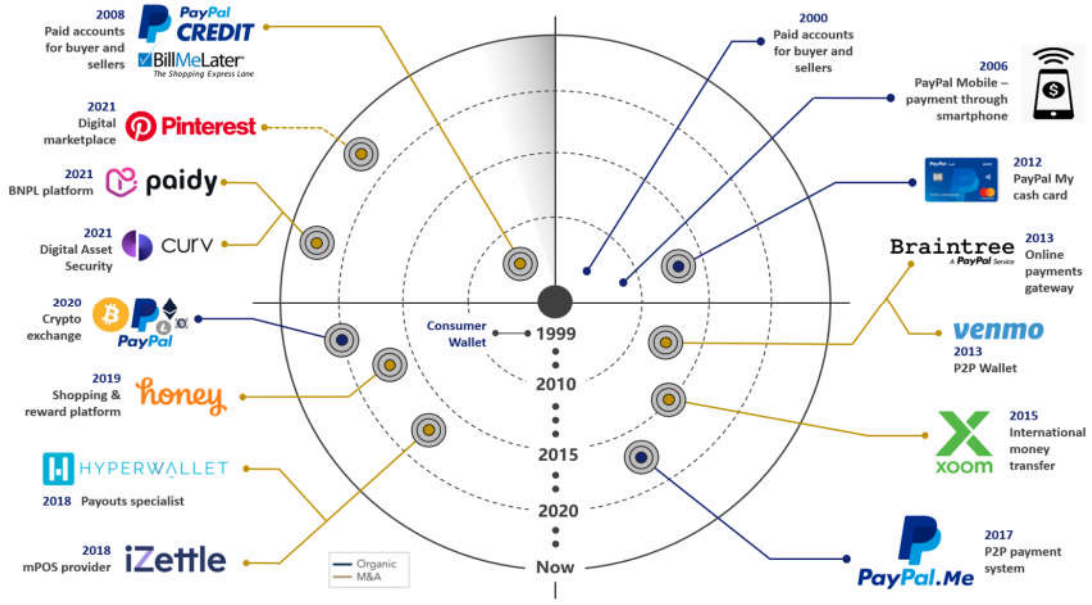
Along with negative expectations, the company's valuation according to the Discounted Cash Flow (DCF) model reached $61.05 per share, supported by an average expected annual growth rate of 8% and a Weighted Average Cost of Capital of 10.7% (Bloomberg, 2024). This valuation indicates a cautious outlook among investors for the company's prospects in the upcoming years. (Appendix 2).

3. FINTECH STRATEGY

3.1. M&A Activities

PayPal's fintech strategy has a total of 26 acquisitions across sectors, some of which were game-changers in the fintech industry (Tracxn, 2024). PayPal once was considered the e-payment monopoly (Hanzlik, 2015) and aimed to maintain its position through M&A (Peter Thiel, 2014). Although this strategy is no longer effective, several deals leveraged PayPal to become a market leader for decades.

Figure 3 - PayPal Ecosystem

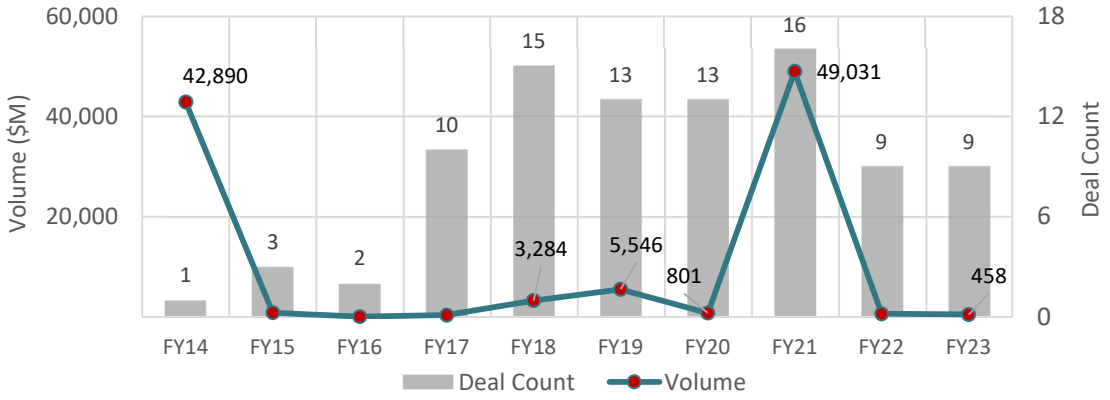


Sources: Graph by author (Appendix 3)

The introduction of Venmo in 2013 marked a significant entry into the peer-to-peer payment, appealing to a younger audience (CNBC, 2019). Followingly, the integration of Braintree enhanced PayPal's payment processing system, reinforcing its position as a reliable intermediary in online transactions (Forbes, 2018). These two acquisitions are now the two major contributors to the company's revenue after separating from eBay.

In addition to these two main revenue-generating segments, PayPal is also actively expanding its ecosystem with M&A deals on POS, Shopping platforms, Digital assets, Cross-border payment, and BNPL (PayPal, 2023). The overarching goal of these efforts is to position PayPal as a comprehensive Super App, providing a variety of services, thereby solidifying its market leader in payment services (PYMNTS, 2021).

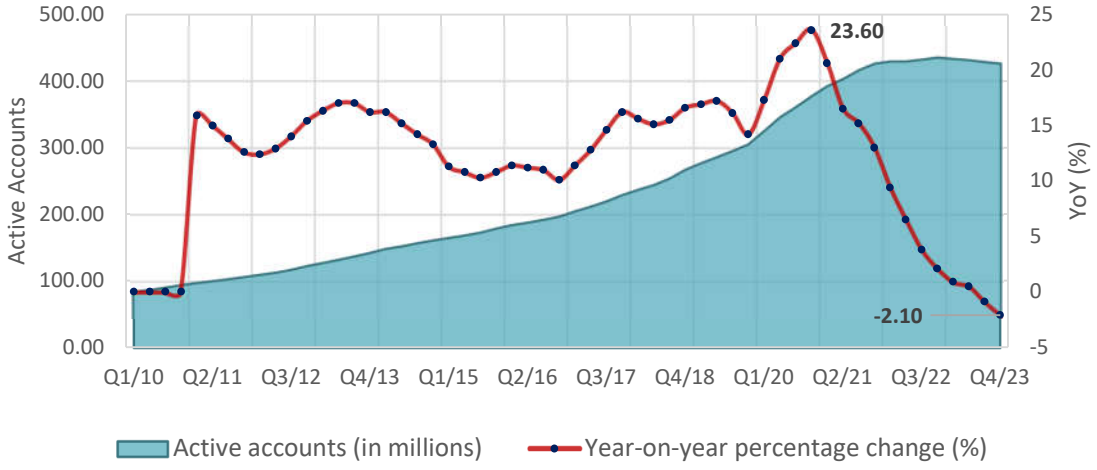
Figure 4 - M&A Value vs Deal



Sources: Data collected from Bloomberg, 2024

After years of aggressive acquisition, PayPal's CEO declared that the firm will prioritize profitable expansion (Annual Report, 2023) and has barely implemented any strategic M&A deals for the last two years (Graph 4). Although this shift reflects an effort towards effective resource reallocation (Couto et al., 2017), the market's response highlights concerns about the increasing competition, thereby leading to a nearly 30% decline in stock performance over the previous year (Bloomberg, 2024).

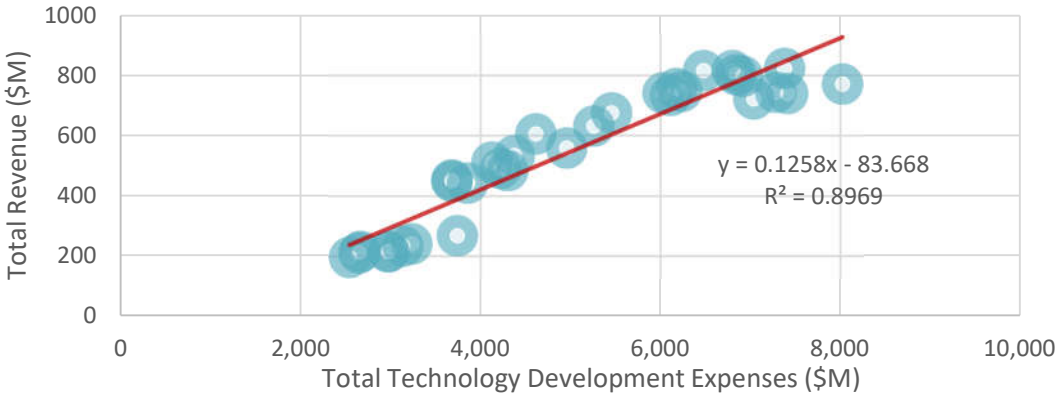
Figure 5 - Decreasing number of PayPal's active users amid high competition



Sources: Data collected from Statista, 2024

This shift towards profitability-focused expansion has proven inefficient due to the declining operating margins and sluggish growth in active users (Reuters, 2023). These trends suggest that PayPal's features are failing to attract new customers and retain existing ones. This inefficiency underscores the challenges PayPal faces in balancing expansion with profitability in an increasingly competitive landscape (Forbes, 2023).

Figure 6 - Scatterplot of Technology Expenses vs Revenue



Sources: Data collected from Quarterly Report (2016-2023)

Indeed, cost-cutting measures, especially technology expenses, should be considered carefully (Bughin et al., 2017; Hur et al., 2019). Graph 5 illustrates a robust positive correlation between revenue and technology and development expenses, indicating a strong predictive power with an R-squared of 0.89. This correlation suggests that investments in technology and development have historically driven revenue growth for PayPal. However, there has been a reduction in the proportion of expenses allocated to technology and development. While this is a part of the profit maximization strategy, this measure raises concerns about the potential signs of stagnation or missed growth opportunities (Lobo & Lima, 1998; Ogbonnaya et al., 2022).

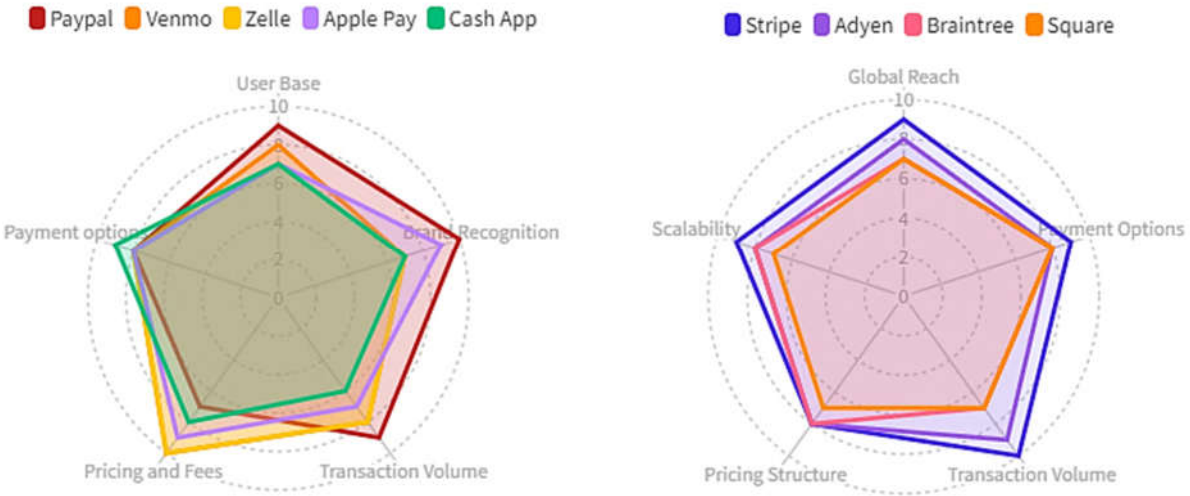
3.2. Threats and gaps

The current strategy is focusing on main segments, including digital wallet (PayPal and Venmo), and payment processing (PayPal and Braintree) (Annual Report, 2023). However, it can be seen that PayPal is facing fierce competition in both core businesses.

Regarding digital wallets, while global payment volume is increasing at a fast pace, PayPal's total payment volume is growing slowly (McKinsey, 2023; Deutsche Bank, 2023). Indeed, PayPal's active accounts have stagnated since 2021 due to heightened

competition. According to the Annual Report 2023, PayPal is facing increased competition from a variety of businesses, including the entry of tech companies (Apple Pay, Google Pay) and payment services backed by major banks (Zelle). In detail, the trend of auto-fill payments and one-click checkout that helps Apple Pay attract younger customers has highlighted PayPal's "*generational problem*" (Financial Times, 2024). Moreover, while PayPal heavily depends on fees, rivals like Zelle are not charging at all. Therefore, PayPal has to innovate itself to win over younger customers, who are ready to switch to a more preferable app (Burke, 2002).

Figure 7 - Digital Wallet & Payment Processing - Competitors Comparison



Sources: Graphs by author (Appendix 4)

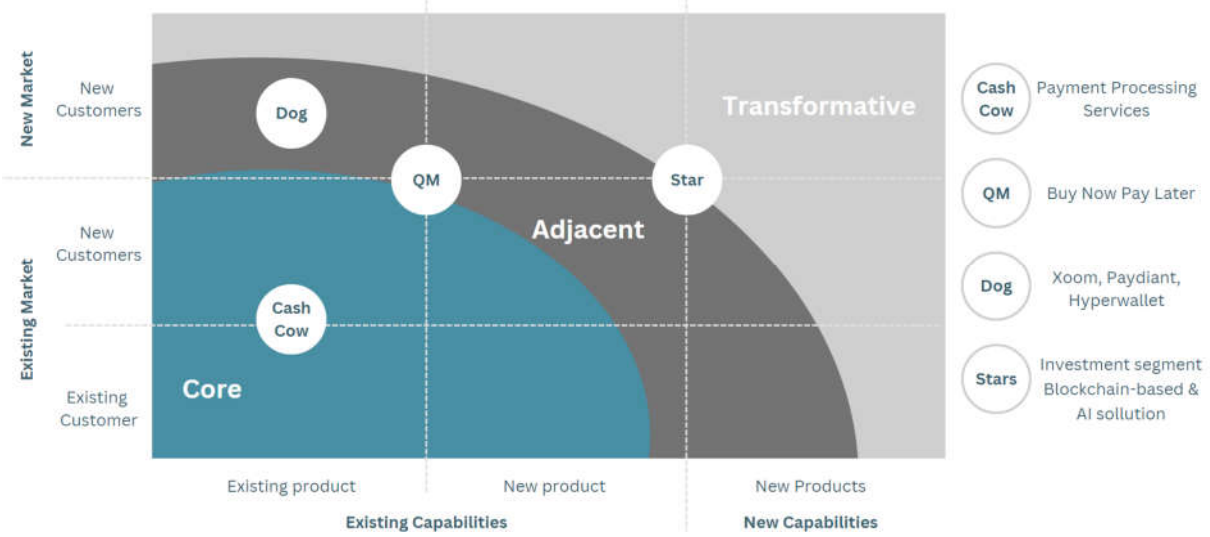
Regarding the payment processing segment, PayPal's financial structure relies heavily on transaction fees (Forbes, 2022), comprising approximately 2% of its Total Payment Volume (TPV). Notably, a portion of this processing occurs through Braintree, a subsidiary of PayPal (PayPal, 2024). This status underscores PayPal's significant dependency on transaction-based revenue streams, particularly when compared with competitors like Adyen and Stripe, whose fees hover around 1% (Adyen, 2024; Stripe, 2024). The pricing strategy employed by Braintree, although lucrative, introduces vulnerabilities stemming from intensified price competition. Notably, emerging competitors such as Adyen, boasting a 16% market share in Europe and serving a high-profile customer base including Apple, Netflix, Meta, Spotify, and even former PayPal customer - eBay, pose a substantial threat to Braintree's market share (Forbes, 2016).

4. RECOMMENDATIONS

4.1. Recommended strategy

The model integrates elements from strategic horizons (Horizon 1 - Core; Horizon 2 - Adjacent; Horizon 3 - Transformative) and product classifications (Cash Cow, Dog, Question Mark, and Star), with additional customizations to make a new framework for PayPal's strategy (Appendix 5).

Figure 8 - PayPal's Fintech Strategy



Source: New model by author upgraded from MSH and BCG

In Horizon 1 – Core, as PayPal is facing challenges in its core products amid fierce competition, it is necessary to focus on key products (**Cash Cow**) of Payment Processing Service to continue generating stable profits and expanding its market share. According to Werth et al. (2023), user-centricity is a critical factor contributing to a fintech's success. Therefore, PayPal should prioritize enhancing user experience and satisfaction, thereby increasing customer loyalty and retention. Firstly, PayPal must urgently address existing product complaints, which have become a pressing issue due to the growing dissatisfaction among customers (Forbes Advisor, 2023). Secondly, innovation is needed to differentiate themselves, attract, and retain customers, especially the younger demographic (Prasetyo et al., 2021). As PayPal should continue its M&A strategy, these strategies should be closely aligned with customer needs and complement PayPal's existing offerings to enhance the overall user experience rather than complicating It (Meta & Ruby, 2007; Weber, 2013).

In Horizon 2 – Adjacent, PayPal needs to conduct R&D to create new fintech products that potentially offer high profits. First of all, PayPal should focus on products that are new and growing (**Question Mark**). Recently, BNPL has become popular and is expected to grow exponentially (Morgan Stanley, 2021). Therefore, developing comprehensive BNPL solutions, mainly driven by millennials and Generation Z (PYMNTS, 2023), can capitalize on market growth and PayPal's popularity among younger users. Additionally, PayPal must address underperforming products (**Dog**) like Xoom, Paydiant, and Hyperwallet. Thorough research is necessary to identify areas for enhancement and optimization, leveraging existing capacities and technology to revitalize these products and meet evolving market demands (Murinde et al., 2022; Una et al., 2023). This strategic approach will position PayPal to capture opportunities and drive sustainable growth.

In Horizon 3 - Transformative, PayPal should develop products that have the potential for a large market share (**Star**). These could be additional fintech sectors such as lending and wealth management or forming strategic partnerships to offer complementary services. By identifying market opportunities, PayPal can solidify its position as an industry leader while tapping into new revenue streams and expanding its customer base. Additionally, during this period, PayPal should invest in disruptive technologies like blockchain and AI to revolutionize payment processing and unlock new opportunities (Muheidat et al., 2022; Khadka, 2020). By embracing innovation, PayPal can stay ahead of the curve and differentiate itself from competitors. This could involve developing blockchain-based solutions for faster and more secure transactions (Yu et al., 2018; Huang et al., 2020), or exploring decentralized finance (DeFi) applications to cater to emerging market demands (Chen et al., 2020; Momtaz, 2022).

4.2. Regulation consideration

Regulatory considerations are paramount in implementing PayPal's strategic model for fintech product development (Koedijk, 1996). As PayPal ventures into new sectors and technologies, it must navigate various regulatory frameworks to ensure trust among users and avoid legal liabilities that could hinder growth and damage reputation (Borne et al., 2018).

In Horizon 1, focusing on core products requires adherence to existing financial regulations to maintain stability and trust in payment processing services (Gomber et al., 2018). Improving customer service must also comply with consumer protection laws and data privacy regulations to enhance user experience without compromising security.

In Horizon 2, introducing new products like BNPL requires thorough compliance with financial regulations governing lending and consumer credit (Johnson, 2021; Soni, 2023). Rapid BNPL growth attracts attention from regulators like the Consumer Financial Protection Bureau, necessitating compliance with evolving standards (CFCB, 2022).

In Horizon 3, investing in disruptive technologies like blockchain requires compliance with evolving regulations to foster innovation while mitigating legal risks (Zemler, 2019). Leveraging AI requires addressing ethical biases and privacy concerns, alongside adherence to stringent data regulations like GDPR and CCPA (ElBaih, 2023).

5. CONCLUSION

PayPal is now at a critical phase in the fast-changing fintech industry, facing challenges stemming from increased competition, shifting consumer preferences, and regulatory complications. While once known as a pioneer in digital payments, the company now faces formidable challenges, including stagnant user growth, intensified competition, and investor skepticism reflected in its stock performance.

To address these challenges and secure its position as a leading player in the payment industry, PayPal must adopt a multifaceted approach. This includes focusing on core products by prioritizing customer-centricity, leveraging adjacent opportunities through strategic R&D and revitalization of underperforming products, and pursuing transformative initiatives to tap into emerging markets and technologies. Additionally, regulatory considerations must remain at the forefront of PayPal's strategic decisions, ensuring compliance with evolving standards while fostering innovation. By implementing these strategic recommendations, PayPal can navigate the complexities of the fintech landscape, unlock new opportunities, and regain its momentum towards sustained growth and market leadership.

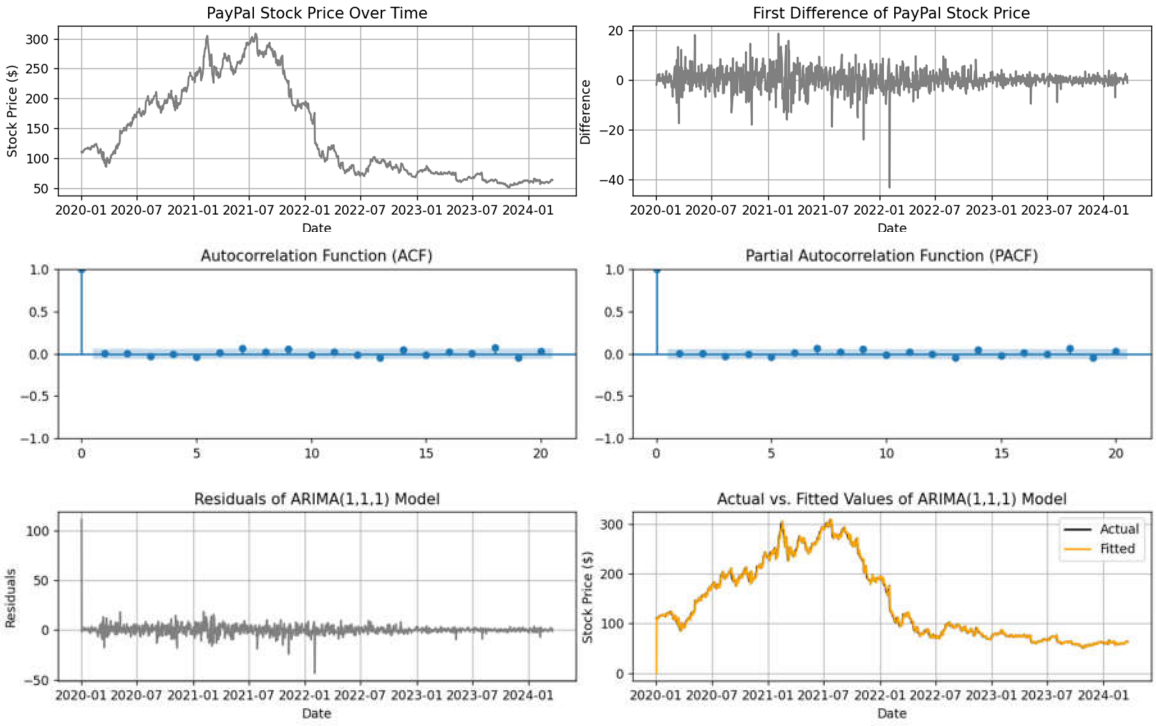
Word count: 2125

APPENDICES

APPENDIX 1 – STOCK PRICE VOLATILITY

ARIMA MODEL

Figure A1.1 – PYPL with ARIMA Modeling and Residuals Examination

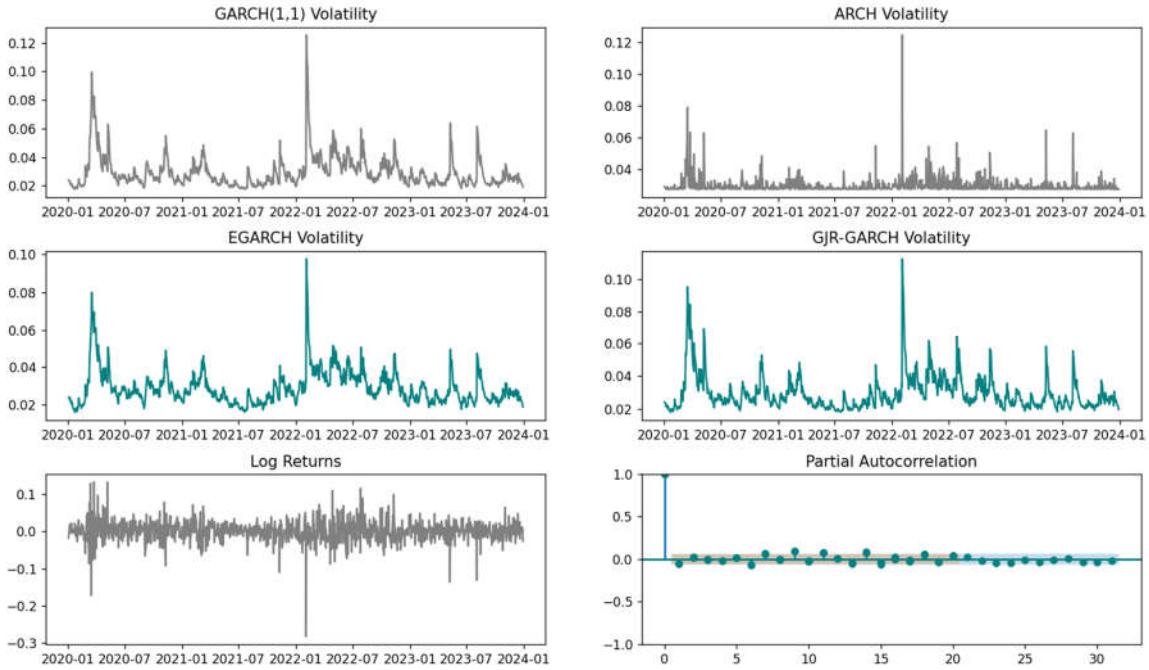


Sources: Graphs by author

Figure A1.1 provides a comprehensive visualization of the ARIMA model's performance when applied to analyze PayPal's stock price dynamics. Through meticulous examination of the autocorrelation function (ACF), partial autocorrelation function (PACF), and residual plot, it is evident that the model adheres to the fundamental principle of lacking autocorrelation, while its residual distribution conforms to normality, exhibiting a symmetrical scatter around zero. These characteristics collectively signify the robustness of the ARIMA(1,1,1) model in capturing the underlying patterns within the stock price data, thereby portraying a high degree of fitting accuracy. Additionally, the residuals demonstrate properties akin to white noise, characterized by randomness and independence, further corroborating the model's appropriateness for capturing the stochastic nature of the stock price fluctuations.

GARCH MODEL

Figure A1.2 – PYPL with Volatility Analysis and Return Characteristics



Sources: Graphs by author

- **ARCH Model Results**

```
ARCH Model Results:
                      Constant Mean - ARCH Model Results
==============================================================================
Dep. Variable:                  Close   R-squared:                       0.000
Mean Model:             Constant Mean   Adj. R-squared:                  0.000
Vol Model:                       ARCH   Log-Likelihood:                2116.80
Distribution:                  Normal   AIC:                           -4227.60
Method:            Maximum Likelihood   BIC:                           -4212.86
                                        No. Observations:                 1005
Date:                Fri, Mar 22 2024   Df Residuals:                     1004
Time:                        22:38:13   Df Model:                            1
                                Mean Model
==============================================================================
                 coef    std err          t      P>|t|       95.0% Conf. Int.
------------------------------------------------------------------------------
mu         -3.3901e-04  1.077e-03     -0.315      0.753 [-2.450e-03,1.772e-03]
                              Volatility Model
==============================================================================
                 coef    std err          t      P>|t|      95.0% Conf. Int.
------------------------------------------------------------------------------
omega      7.4530e-04  9.572e-05      7.786  6.898e-15 [5.577e-04,9.329e-04]
alpha[1]       0.1865  7.751e-02      2.407  1.610e-02   [3.462e-02,  0.338]
==============================================================================
```

- **GARCH Model Results**

```
GARCH(1,1) Model Results:
                     Constant Mean - GARCH Model Results
==============================================================================
Dep. Variable:                   Close   R-squared:                       0.000
Mean Model:             Constant Mean   Adj. R-squared:                  0.000
Vol Model:                      GARCH   Log-Likelihood:                2168.61
Distribution:                  Normal   AIC:                           -4329.21
Method:            Maximum Likelihood   BIC:                           -4309.56
                                        No. Observations:                 1005
Date:                Fri, Mar 22 2024   Df Residuals:                     1004
Time:                        22:38:13   Df Model:                            1
                            Mean Model
==============================================================================
                 coef    std err          t      P>|t|       95.0% Conf. Int.
------------------------------------------------------------------------------
mu         -5.7038e-06  9.669e-04 -5.899e-03      0.995 [-1.901e-03,1.889e-03]
                          Volatility Model
==============================================================================
                 coef    std err          t      P>|t|      95.0% Conf. Int.
------------------------------------------------------------------------------
omega      5.6071e-05  1.621e-05      3.459  5.417e-04 [2.430e-05,8.784e-05]
alpha[1]       0.1868  8.725e-02      2.141  3.226e-02   [1.581e-02,  0.358]
beta[1]        0.7755  5.688e-02     13.633  2.537e-42     [  0.664,  0.887]
==============================================================================
```

- **EGARCH Model Results**

```
EGARCH Model Results:
                     Constant Mean - EGARCH Model Results
==============================================================================
Dep. Variable:                   Close   R-squared:                       0.000
Mean Model:             Constant Mean   Adj. R-squared:                  0.000
Vol Model:                      EGARCH   Log-Likelihood:                2175.44
Distribution:                  Normal   AIC:                           -4342.88
Method:            Maximum Likelihood   BIC:                           -4323.23
                                        No. Observations:                 1005
Date:                Fri, Mar 22 2024   Df Residuals:                     1004
Time:                        22:38:13   Df Model:                            1
                            Mean Model
==============================================================================
                 coef    std err          t      P>|t|       95.0% Conf. Int.
------------------------------------------------------------------------------
mu          1.8241e-04  5.705e-04      0.320      0.749 [-9.358e-04,1.301e-03]
                          Volatility Model
==============================================================================
                 coef    std err          t      P>|t|      95.0% Conf. Int.
------------------------------------------------------------------------------
omega         -0.3913      0.154     -2.537  1.119e-02 [ -0.694,-8.897e-02]
alpha[1]       0.2782  8.311e-02      3.348  8.147e-04    [  0.115,  0.441]
beta[1]        0.9428  2.234e-02     42.199      0.000    [  0.899,  0.987]
==============================================================================
```

- **GJR- GARCH Model Results**

```
GJR-GARCH Model Results:
                  Constant Mean - GJR-GARCH Model Results
==============================================================================
Dep. Variable:                   Close   R-squared:                       0.000
Mean Model:             Constant Mean   Adj. R-squared:                  0.000
Vol Model:                  GJR-GARCH   Log-Likelihood:                2169.57
Distribution:                  Normal   AIC:                           -4329.13
Method:            Maximum Likelihood   BIC:                           -4304.57
                                        No. Observations:                 1005
Date:                Fri, Mar 22 2024   Df Residuals:                     1004
Time:                        22:38:13   Df Model:                            1
                            Mean Model
==============================================================================
                 coef    std err          t      P>|t|       95.0% Conf. Int.
------------------------------------------------------------------------------
mu         2.4415e-04  7.871e-04      0.310      0.756 [-1.299e-03,1.787e-03]
                          Volatility Model
==============================================================================
                 coef    std err          t      P>|t|      95.0% Conf. Int.
------------------------------------------------------------------------------
omega      6.1394e-05  2.045e-05      3.003  2.675e-03 [2.132e-05,1.015e-04]
alpha[1]       0.2359      0.176      1.340      0.180     [ -0.109,  0.581]
gamma[1]      -0.0886      0.185     -0.478      0.633     [ -0.452,  0.275]
beta[1]        0.7658  6.656e-02     11.505  1.249e-30     [  0.635,  0.896]
==============================================================================
```

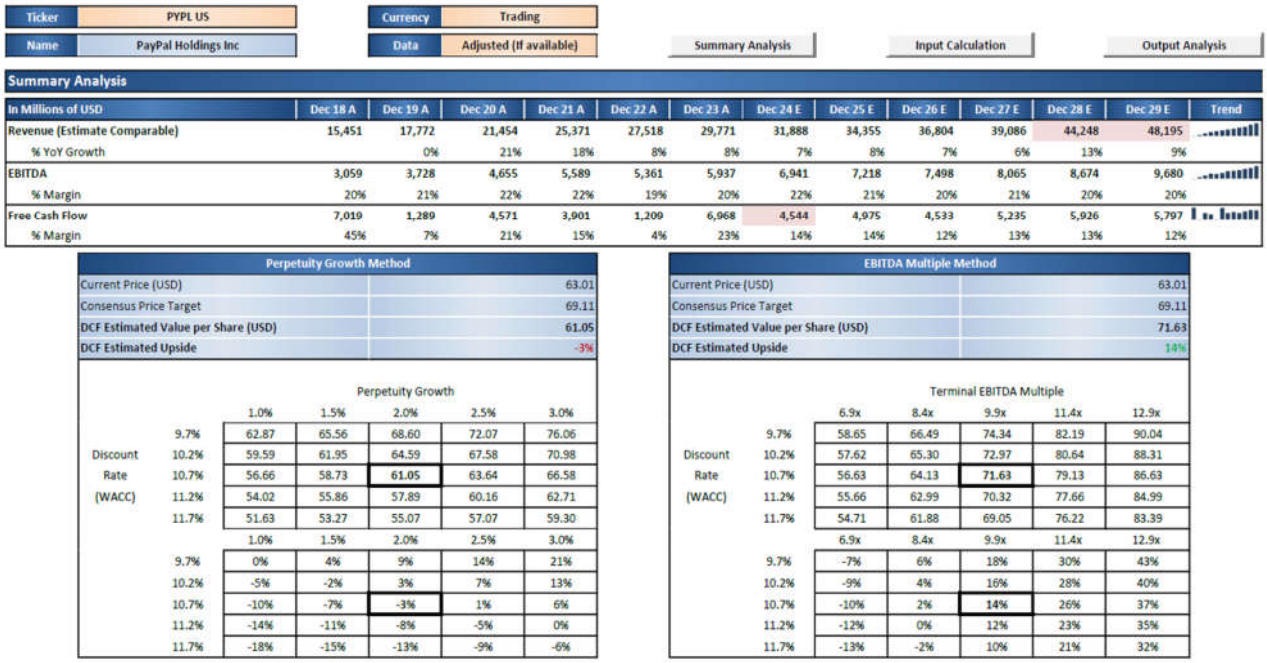
Figure A1.2 presents the results of various volatility GARCH models such as GARCH(1,1), ARCH, EGARCH, and GJR-GARCH. It's worth noting that all these models, except for GJR-GARCH, show statistical significance. This suggests that they effectively capture the complex fluctuations found in the stock's volatility.

The EGARCH model shines due to its exceptional performance metrics, as evidenced by significantly lower values for both the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). This indicates that the EGARCH model achieves an ideal equilibrium between model complexity and fitting accuracy, providing the most compelling depiction of the inherent volatility dynamics within PayPal's stock price movements. Moreover, the residuals of the EGARCH model display traits consistent with white noise, signifying a lack of discernible patterns and bolstering the model's effectiveness in accurately capturing the stochastic nature of volatility fluctuations.

APPENDIX 2 – FINANCIAL MODELING

ABSOLUTE VALUATION

Figure A2.1 – Discounted Cash Flow of PYPL



Ticker	PYPL US	Currency	Trading
Name	PayPal Holdings Inc	Data	Adjusted (If available)

Summary Analysis | Input Calculation | Output Analysis

Summary Analysis

In Millions of USD	Dec 18 A	Dec 19 A	Dec 20 A	Dec 21 A	Dec 22 A	Dec 23 A	Dec 24 E	Dec 25 E	Dec 26 E	Dec 27 E	Dec 28 E	Dec 29 E	Trend
Revenue (Estimate Comparable)	15,451	17,772	21,454	25,371	27,518	29,771	31,888	34,355	36,804	39,086	44,248	48,195	
% YoY Growth		0%	21%	18%	8%	8%	7%	8%	7%	6%	13%	9%	
EBITDA	3,059	3,728	4,655	5,589	5,361	5,937	6,941	7,218	7,498	8,065	8,674	9,680	
% Margin	20%	21%	22%	22%	19%	20%	22%	21%	20%	21%	20%	20%	
Free Cash Flow	7,019	1,289	4,571	3,901	1,209	6,968	4,544	4,975	4,533	5,235	5,926	5,797	
% Margin	45%	7%	21%	15%	4%	23%	14%	14%	12%	13%	13%	12%	

Perpetuity Growth Method

Current Price (USD)	63.01
Consensus Price Target	69.11
DCF Estimated Value per Share (USD)	61.05
DCF Estimated Upside	-3%

Perpetuity Growth

Discount Rate (WACC)	1.0%	1.5%	2.0%	2.5%	3.0%
9.7%	62.87	65.56	68.60	72.07	76.06
10.2%	59.59	61.95	64.59	67.58	70.98
10.7%	56.66	58.73	61.05	63.64	66.58
11.2%	54.02	55.86	57.89	60.16	62.71
11.7%	51.63	53.27	55.07	57.07	59.30

Discount Rate (WACC)	1.0%	1.5%	2.0%	2.5%	3.0%
9.7%	0%	4%	9%	14%	21%
10.2%	-5%	-2%	3%	7%	13%
10.7%	-10%	-7%	-3%	1%	6%
11.2%	-14%	-11%	-8%	-5%	0%
11.7%	-18%	-15%	-13%	-9%	-6%

EBITDA Multiple Method

Current Price (USD)	63.01
Consensus Price Target	69.11
DCF Estimated Value per Share (USD)	71.63
DCF Estimated Upside	14%

Terminal EBITDA Multiple

Discount Rate (WACC)	6.9x	8.4x	9.9x	11.4x	12.9x
9.7%	58.65	66.49	74.34	82.19	90.04
10.2%	57.62	65.30	72.97	80.64	88.31
10.7%	56.63	64.13	71.63	79.13	86.63
11.2%	55.66	62.99	70.32	77.66	84.99
11.7%	54.71	61.88	69.05	76.22	83.39

Discount Rate (WACC)	6.9x	8.4x	9.9x	11.4x	12.9x
9.7%	-7%	6%	18%	30%	43%
10.2%	-9%	4%	16%	28%	40%
10.7%	-10%	2%	14%	26%	37%
11.2%	-12%	0%	12%	23%	35%
11.7%	-13%	-2%	10%	21%	32%

Source: Data collected from Bloomberg

From the provided information, we can draw several conclusions about PayPal's valuation and potential investment implications:

Revenue, EBITDA, and Free Cash Flow Growth:

PayPal is expected to experience moderate growth in key financial metrics such as revenue (7-8%), EBITDA (about 20%), and Free Cash Flow (about 13%) in the following years. This indicates that the company is expected to continue its growth trajectory, albeit at a slightly slower pace compared to EBITDA growth.

Discounted Cash Flow (DCF) Valuation:

- **Perpetuity Growth Method:** Using a perpetuity growth method and a Weighted Average Cost of Capital (WACC) of 10.7%, the estimated value per share is $61.05, which is 3% less than the current price. This suggests that according to the DCF analysis, PayPal's stock is currently overvalued.
- **EBITDA Multiple Method:** Using an EBITDA multiple method with a similar WACC level, the estimated value per share is $71.63, which is 14% higher than

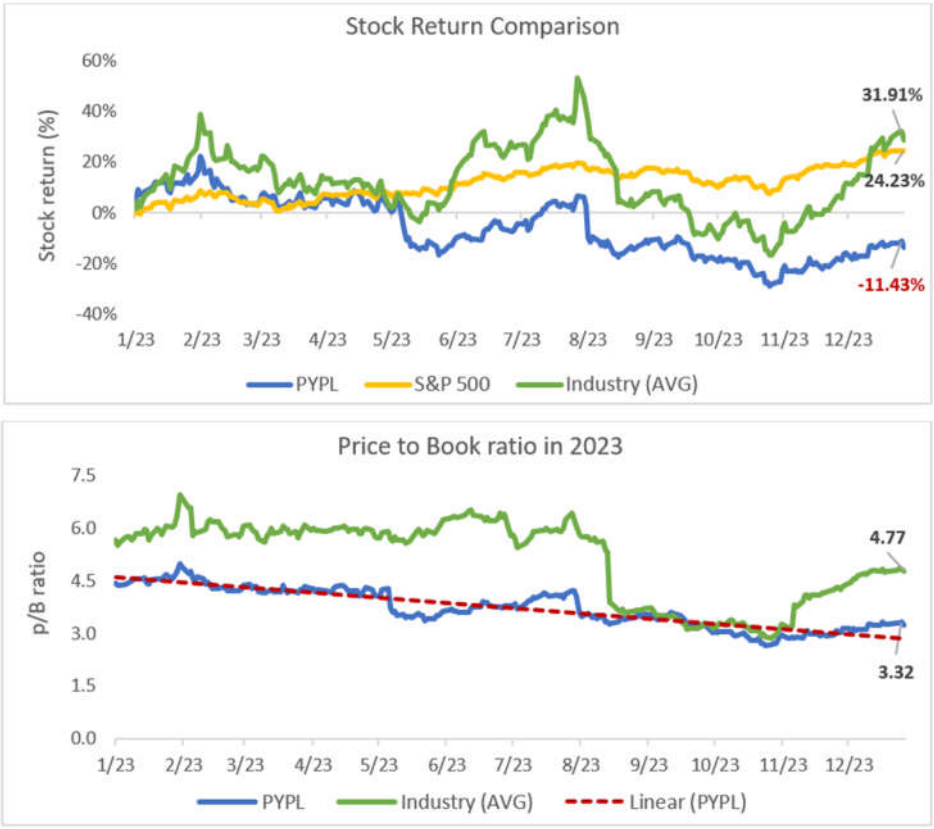
the current price. This indicates that according to this valuation method, PayPal's stock is undervalued.

Sensitivity Analysis:

- **Perpetuity Growth Method:** The sensitivity analysis shows that the upside potential for PayPal's stock, based on the perpetuity growth method, ranges from -18% to 21%. This suggests that there is a wide range of potential outcomes, with a possibility of both downside and upside.
- **EBITDA Multiple Method:** The sensitivity analysis for the EBITDA multiple method indicates a wider range of potential outcomes, with the upside rate ranging from -13% to 43%. This suggests even greater variability in potential stock performance using this valuation approach.

RELATIVE VALUATION

Figure A2.2 – Stock price performance of PYPL in 2023



Source: Data collected from Bloomberg

Figure A2.3 – Projected P/E and P/B of PYPL vs Industry

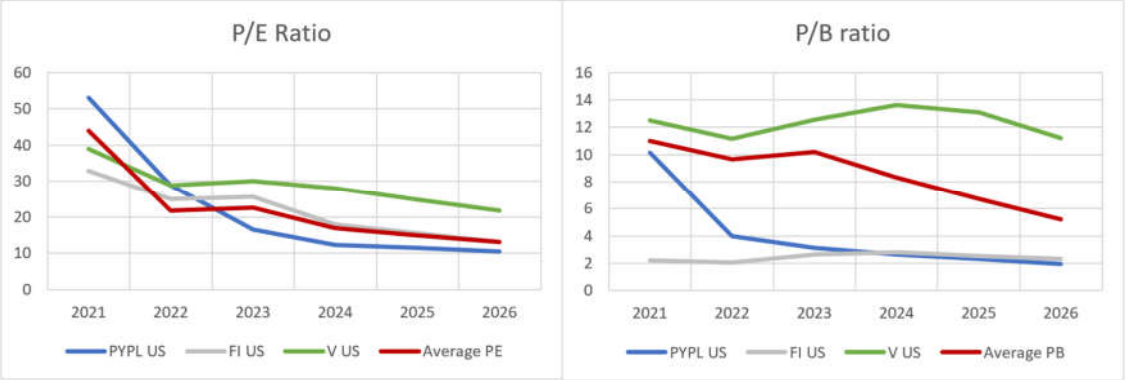
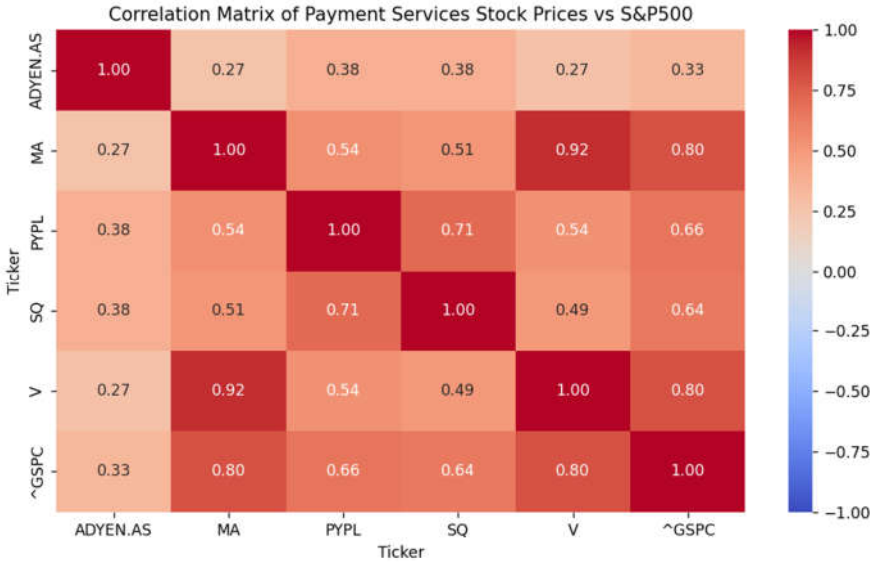


Figure A2.4 – The correlations of stock prices vs S&P 500



Source: Graphs by author

From Figures A2.2, A2.3, A2.4, stock prices of the payment services industry often tend to move together based on market movements. In 2023, PayPal demonstrated weaker performance compared to both the S&P 500 index and its payment services industry peers. Despite its current position as a market leader, PayPal's estimated valuation over the next four years, gauged by Price-to-Earnings (P/E) and Price-to-Book (P/B) ratios, is anticipated to be less favorable than industry averages. This suggests potential overvaluation concerns relative to its earnings and book value. Investors should carefully assess the reasons behind PayPal's underperformance and the implications for its future growth prospects. It underscores the necessity for thorough analysis and consideration of market dynamics when evaluating PayPal as an investment opportunity.

APPENDIX 3 - PAYPAL ECOSYSTEM

Figure A3.1 – Core Strategic M&A deals of PayPal since 2008

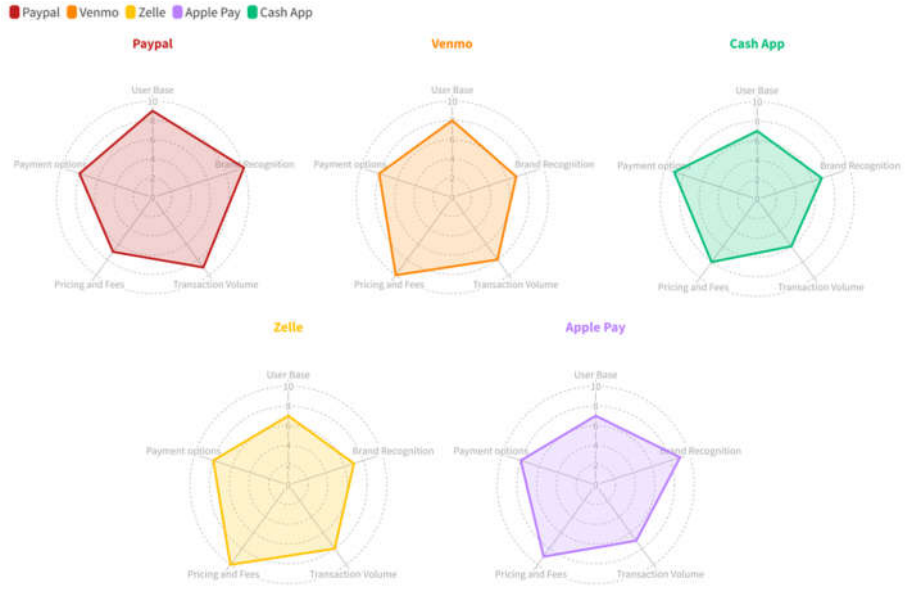
Name	Year	Value (USD million)	Details
Paypal Credit Bill Me Later	2008	820	Consumer credit "pay later"
Braintree	2013	800	Online payments gateway
Venmo	2013		P2P wallet
Xoom	2015	890	International money transfer
iZettle	2018	2,200	mPOS provider
Hyperwallet	2018	400	Payouts specialist
Honey	2019	4,000	Shopping & rewards platform
Paidy	2021	2,700	BNPL platform
Curv	2021	200	Digital Asset Security
Pinterest	2021	N/A	Digital Marketplace

Source: Compiled by author

In recent years, PayPal has strategically broadened its portfolio through a series of acquisitions, establishing itself as a powerhouse in the fintech realm. Notable acquisitions include PayPal Credit (formerly Bill Me Later) in 2008, valued at USD 820 million, which transformed consumer credit with its "pay later" feature. In 2013, Braintree was acquired for USD 800 million, bolstering PayPal's online payment capabilities. The same year, Venmo, a peer-to-peer (P2P) wallet service, was acquired, consolidating its digital payments presence. Further acquisitions followed, such as Xoom in 2015 for USD 890 million, facilitating international money transfers, and iZettle in 2018 for USD 2.2 billion, tapping into the mobile point-of-sale (mPOS) market. Hyperwallet was acquired for USD 400 million, strengthening its payouts expertise. In 2019, PayPal made waves with the USD 4 billion acquisition of Honey, integrating a shopping and rewards platform. Expansions continued with Paidy in 2021, a "buy now, pay later" (BNPL) platform for USD 2.7 billion, and Curv for USD 200 million, enhancing digital asset security. Additionally, the acquisition of Pinterest, a digital marketplace in 2021, further diversified its offerings. Through these strategic moves, PayPal has cemented its position across fintech sectors, poised for ongoing growth and innovation in the ever-evolving digital payments landscape.

APPENDIX 4 – PAYPAL'S COMPETITORS EVALUATION

Figure A4.1 – Digital Wallet - Competitors Comparison

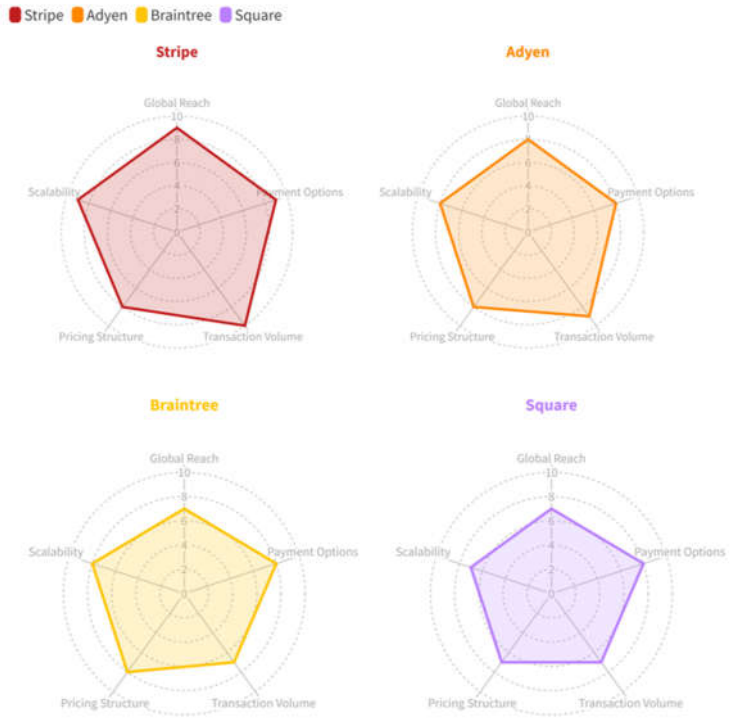


Source: Graphs by author

Venmo stands out for its competitive pricing and fees, which are on par with Zelle. It offers a decent range of payment options, boasts a sizable user base, and maintains a respectable transaction volume. While it enjoys good brand recognition, it falls slightly short compared to PayPal.Cash App leads in payment options but trails in user base, transaction volume, and brand recognition. Its pricing and fees are reasonable, but not as competitive as Venmo or Zelle. Zelle offers competitive pricing and fees comparable to Venmo, with a significant volume of transactions. It provides a range of payment options and boasts a user base and brand recognition similar to that of Venmo. Apple Pay ranks second only to PayPal in digital wallet brand recognition, but it lags in user base and transaction volume. This is partly due to its status as a relatively new platform and its limitation to iPhone users only. However, despite these constraints, Apple Pay is experiencing rapid growth. Its pricing and fees are better than PayPal's while offering a similar range of payment options.

In summary, the showcased digital wallets present a formidable challenge to PayPal's dominance, particularly in terms of pricing and fees. Each platform offers competitive rates that rival or surpass those of PayPal, thereby posing a significant threat to its market share in the future.

Figure A4.2 – Payment Processing - Competitors Comparison



Source: Graphs by author

Braintree, a subsidiary of PayPal, delivers a performance that could be described as middling. While it boasts a respectable pricing structure and scalability, its transaction volume is severely limited. Moreover, its global presence lags behind industry leaders like Stripe and Adyen, as it has yet to penetrate many businesses worldwide.

Stripe, on the other hand, emerges as a standout performer across the board. It commands the largest transaction volume among the four platforms and offers the widest array of payment options. Notably, it has proven to be the most adept at scalability and possesses an unparalleled global reach

Adyen demonstrates a decent performance across all five aspects, with certain metrics such as transaction volume and global reach outperforming Braintree's.

Square, while comparable to Braintree in terms of payment options and transaction volume, falls short in all other aspects when pitted against its competitors

In summary, while Braintree maintains an acceptable standing overall, its position in the market is not guaranteed. It is facing the threat of being overshadowed by competitors with more advantageous offerings.

APPENDIX 5 – MCKINSEY'S STRATEGIC HORIZONS

According to Blank (2019), using McKinsey's Strategic Horizons time frame is no longer appropriate for a rapidly evolving industry as it can cause companies to fall behind their peers. Therefore, this study has the following adjustments and upgrades:

Horizon 1: Maintaining and expanding current core business (1 year)

Horizon 1 aims to maintain and enhance the current business operations, encompassing the primary products and markets that contribute the majority of the company's current revenue. Typically, this involves competing with rivals in the established market to maintain market share, ensuring satisfaction among current customers, and tactically enhancing offerings to attract new customers. During this phase, efforts are concentrated on extending and fortifying the business through various means, such as product improvement, introducing new models and versions, and emphasizing promotions and market segmentation. The primary focus is on executing the business plan and generating cash flow to support Horizon 2 initiatives.

Horizon 2: Fostering emerging new business (1-2 years)

Horizon 2 aims at expanding the current business into adjacent markets or products that are relatively new. Companies in this stage need to explore new markets, technologies, and products, setting the framework for future expansion and diversification beyond the current offerings. These initiatives often exhibit higher growth potential compared to established products and may become significant revenue generators. Strategies in this phase involve making substantial investments in sales/distribution, marketing, and product development to position the company for substantial profits in the future.

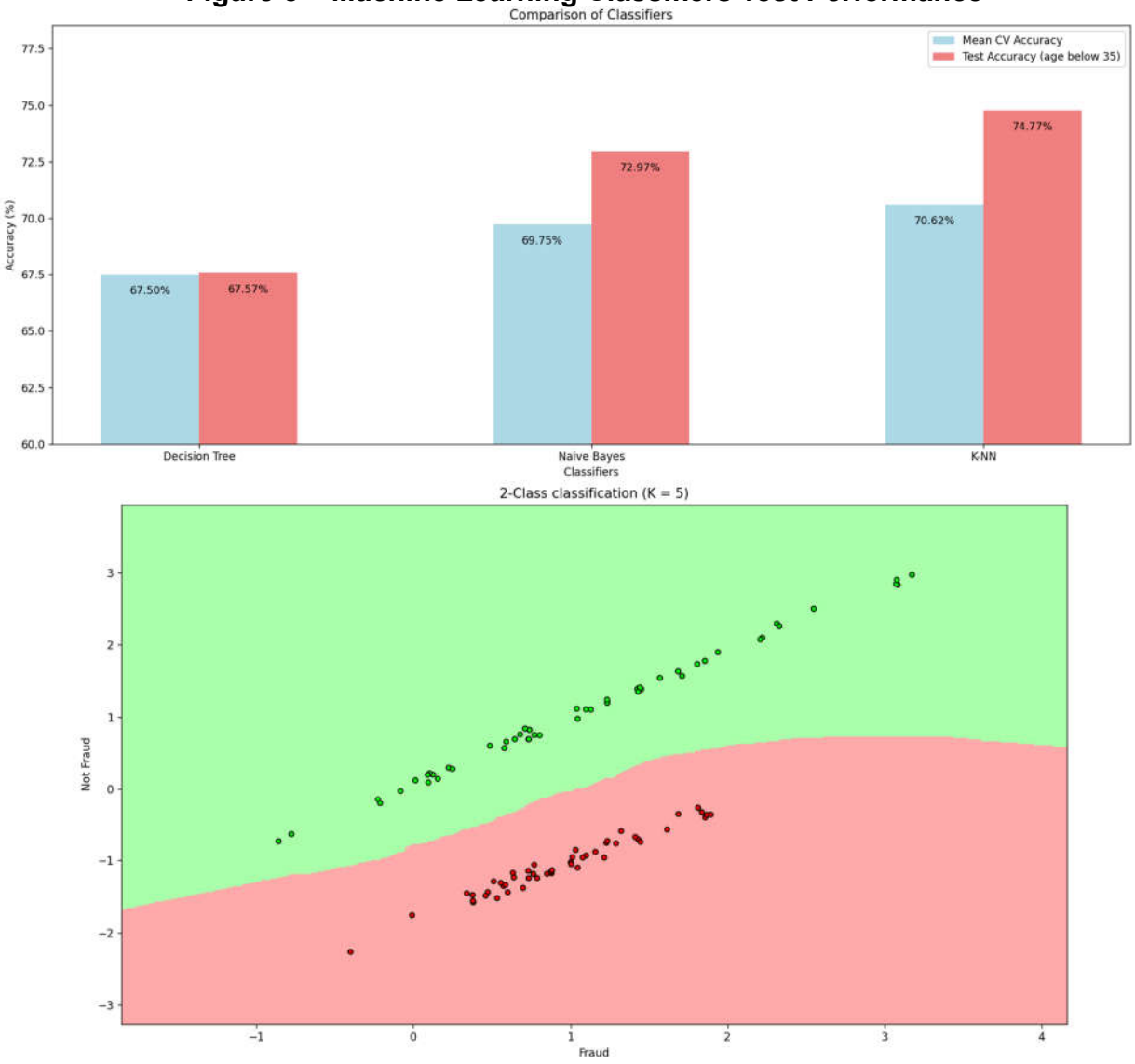
Horizon 3: Seeding future business (3-5 years)

Horizon 3 involves exploring radical and disruptive innovations with the potential to change the industry in the future. During this horizon, companies focus on developing potential new product opportunities that could drive profit and growth in the long-term future. By investing in visionary ideas and breakthrough technologies, organizations can establish themselves as industry leaders and anticipate market disruptions. Opportunities in this phase could range from exploring emerging technologies to conducting Research & Development projects and implementing pilot programs with customers.

APPENDIX 6 – MACHINE LEARNING MODEL TO MANAGE RISK IN BNPL

Due to the nature of BNPL, it shares numerous similarities with credit cards. However, leveraging BNPL to engage young users in accessing PayPal and Venmo presents certain challenges, notably the elevated default rates among Gen Z and millennials. Consequently, it's imperative for PayPal to proactively address and mitigate this risk, beginning with a thorough risk assessment during the approval process.

Figure 5 – Machine Learning Classifiers Test Performance



Source: Graph by author using Python

To effectively address the risks associated with Buy Now Pay Later (BNPL) services, it is imperative to implement tailored risk management strategies that integrate advanced machine learning models such as Decision Trees, K-nearest neighbors (KNN), and Naive Bayes classifiers. These models play a crucial role in enhancing the accuracy of default rate prediction, which is essential for identifying and mitigating potential credit risks inherent in BNPL transactions.

These advanced machine learning techniques have been demonstrated to enhance default rate prediction accuracy, particularly when applied to demographic-specific datasets such as those focusing on the under-35 demographic, as illustrated in Figure 5 from the UCI dataset. This highlights the significance of demographic insights in refining risk management strategies within the fintech industry.

Furthermore, the results indicate that the KNN model provides the highest accuracy among the three models tested. This insight is particularly valuable as it suggests that KNN may be the most effective model for predicting default credit risk in the context of BNPL services. Leveraging this result, financial institutions can potentially apply the KNN model to BNPL transactions to better assess and manage credit risks, thereby ensuring the sustainability and success of BNPL offerings in the fintech market.

By incorporating advanced machine learning techniques and demographic insights into risk management strategies, financial institutions can gain deeper insights into customer behaviors and preferences, tailor their offerings accordingly, and effectively navigate regulatory requirements while mitigating credit risks. This holistic approach is essential for fostering trust among customers, enhancing financial stability, and driving long-term success in the rapidly evolving landscape of BNPL services.

APPENDIX 7 – SCRIPT CODE

1. Figure A1.1 – PYPL with ARIMA Modeling and Residuals Examination

```
import yfinance as yf
import matplotlib.pyplot as plt
from statsmodels.tsa.arima.model import ARIMA
from statsmodels.graphics.tsaplots import plot_acf, plot_pacf

# Fetch PayPal stock price data from Yahoo Finance
paypal_data = yf.download('PYPL', start='2020-01-01', end='2024-03-20')

# Create subplots
fig, axs = plt.subplots(3, 2, figsize=(15, 15))

# Plot the time series
axs[0, 0].plot(paypal_data.index, paypal_data['Close'], label='PayPal Stock Price',
color='grey')
axs[0, 0].set_title('PayPal Stock Price Over Time')
axs[0, 0].set_xlabel('Date')
axs[0, 0].set_ylabel('Stock Price ($)')
axs[0, 0].grid(True)

# Check for stationarity
axs[0, 1].plot(paypal_data.index, paypal_data['Close'].diff(), label='First
Difference', color='grey')
axs[0, 1].set_title('First Difference of PayPal Stock Price')
axs[0, 1].set_xlabel('Date')
axs[0, 1].set_ylabel('Difference')
axs[0, 1].grid(True)

# Plot ACF and PACF to determine ARIMA parameters
plot_acf(paypal_data['Close'].diff().dropna(), lags=20, ax=axs[1, 0])
axs[1, 0].set_title('Autocorrelation Function (ACF)')

plot_pacf(paypal_data['Close'].diff().dropna(), lags=20, ax=axs[1, 1])
axs[1, 1].set_title('Partial Autocorrelation Function (PACF)')

# Fit ARIMA model
# Based on ACF and PACF plots, we'll choose ARIMA(1,1,1) as an example
model = ARIMA(paypal_data['Close'], order=(1,1,1))
results = model.fit()

# Plot residuals
residuals = results.resid
axs[2, 0].plot(paypal_data.index, residuals, color='grey')
axs[2, 0].set_title('Residuals of ARIMA(1,1,1) Model')
axs[2, 0].set_xlabel('Date')
axs[2, 0].set_ylabel('Residuals')
axs[2, 0].grid(True)

# Plot actual vs. fitted values
axs[2, 1].plot(paypal_data.index, paypal_data['Close'], label='Actual', color='black')
axs[2, 1].plot(paypal_data.index, results.fittedvalues, color='yellow',
label='Fitted')
axs[2, 1].set_title('Actual vs. Fitted Values of ARIMA(1,1,1) Model')
axs[2, 1].set_xlabel('Date')
axs[2, 1].set_ylabel('Stock Price ($)')
axs[2, 1].legend()
axs[2, 1].grid(True)

# Adjust layout
plt.tight_layout()

# Show the plot
plt.show()
```

2. Figure A1.2 – PYPL with Volatility Analysis and Return Characteristics

```
import yfinance as yf
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import arch

# Fetch PayPal stock data from Yahoo Finance
paypal_data = yf.download('PYPL', start='2020-01-01', end='2024-01-01')

# Selecting only the 'Close' prices
data = paypal_data[['Close']]

# Calculate log returns
returns = np.log(data['Close']).diff().dropna()

# Fit different volatility models
garch_model = arch.arch_model(returns, vol='Garch', p=1, q=1)
arch_model = arch.arch_model(returns, vol='Arch')
egarch_model = arch.arch_model(returns, vol='EGarch')
gjr_garch_model = arch.arch_model(returns, vol='Garch', p=1, o=1, q=1)

# Estimate the models
garch_results = garch_model.fit(disp='off')
arch_results = arch_model.fit(disp='off')
egarch_results = egarch_model.fit(disp='off')
gjr_garch_results = gjr_garch_model.fit(disp='off')

# Plot volatility forecasts
fig, axs = plt.subplots(3, 2, figsize=(14, 18))

# GARCH(1,1)
garch_volatility = garch_results.conditional_volatility
axs[0, 0].plot(garch_volatility, color='grey')
axs[0, 0].set_title('GARCH(1,1) Volatility')

# ARCH
arch_volatility = arch_results.conditional_volatility
axs[0, 1].plot(arch_volatility, color='grey')
axs[0, 1].set_title('ARCH Volatility')

# EGARCH
egarch_volatility = egarch_results.conditional_volatility
axs[1, 0].plot(egarch_volatility, color='teal')
axs[1, 0].set_title('EGARCH Volatility')

# GJR-GARCH
gjr_garch_volatility = gjr_garch_results.conditional_volatility
axs[1, 1].plot(gjr_garch_volatility, color='teal')
axs[1, 1].set_title('GJR-GARCH Volatility')

# Plotting the returns
axs[2, 0].plot(returns, color='grey')
axs[2, 0].set_title('Log Returns')

# Plotting the ACF and PACF of returns
from statsmodels.graphics.tsaplots import plot_acf, plot_pacf
plot_acf(returns, ax=axs[2, 1], color='teal')
plot_pacf(returns, ax=axs[2, 1], color='teal', lags=20)

# Adjust layout
plt.tight_layout()
plt.show()
```

3. Correlation Heatmap

```
import yfinance as yf
import matplotlib.pyplot as plt
import seaborn as sns

# Define the ticker symbols
tickers = ['PYPL', 'ADYEN.AS', 'SQ', 'V', 'MA', '^GSPC']  # Yahoo Finance ticker
symbols

# Fetch historical data from Yahoo Finance
data = yf.download(tickers, start="2020-01-01", end="2024-01-01", interval="1d")  #
Adjust the start and end dates as needed

# Extract the 'Close' prices
close_prices = data['Adj Close']

# Calculate daily returns
returns = close_prices.pct_change()

# Calculate correlation matrix
correlation_matrix = returns.corr()

# Plot correlation heatmap
plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt=".2f", vmin=-1,
vmax=1)
plt.title('Correlation Matrix of Payment Services Stock Prices vs S&P500')
plt.show()
```

4. Machine Learning Classifiers

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.tree import DecisionTreeClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import cross_val_score, train_test_split, KFold
from sklearn.preprocessing import StandardScaler
from matplotlib.colors import ListedColormap
from sklearn.datasets import make_classification  # Add this import

# Load dataset from the provided path
file_path = r'D:\Fintech\Semester 2\Big Data\Final.csv'  # Replace 'your_dataset.csv'
with the actual filename
data = pd.read_csv(file_path)

categorical_cols = ['checking_status', 'credit_history', 'purpose', 'savings_status',
'employment',
                    'personal_status', 'other_parties', 'property_magnitude',
'other_payment_plans',
                    'housing', 'job', 'own_telephone', 'foreign_worker']

# One-hot encode categorical columns
data_encoded = pd.get_dummies(data, columns=categorical_cols)

# Assuming 'age' is one of the features
# Splitting the dataset into train and test sets based on age
X = data_encoded.drop(columns=['class'])  # Assuming 'class' is the target variable
y = data_encoded['class']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
random_state=42)
age_train = X_train['age']
age_test = X_test['age']
```

```
age_test = X_test['age']

# Filter out the test set where age is below 35
X_test_filtered = X_test[age_test < 35]
y_test_filtered = y_test[age_test < 35]

# Define classifiers
clf_decision_tree = DecisionTreeClassifier()
clf_naive_bayes = GaussianNB()
clf_knn = KNeighborsClassifier()

# Define KFold cross-validation
kf = KFold(n_splits=10, shuffle=True, random_state=42)

# Perform cross-validation for Decision Tree
cv_scores_decision_tree = cross_val_score(clf_decision_tree, X_train, y_train,
cv=kf)

# Perform cross-validation for Naive Bayes
cv_scores_naive_bayes = cross_val_score(clf_naive_bayes, X_train, y_train,
cv=kf)

# Perform cross-validation for K-NN
# It's recommended to scale the features for K-NN
scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_filtered_scaled = scaler.transform(X_test_filtered)
cv_scores_knn = cross_val_score(clf_knn, X_train_scaled, y_train, cv=kf)

# Train the models on the full training set
clf_decision_tree.fit(X_train, y_train)
clf_naive_bayes.fit(X_train, y_train)
clf_knn.fit(X_train_scaled, y_train)

# Evaluate the models on the filtered test set
test_accuracy_decision_tree = clf_decision_tree.score(X_test_filtered,
y_test_filtered)
test_accuracy_naive_bayes = clf_naive_bayes.score(X_test_filtered,
y_test_filtered)
test_accuracy_knn = clf_knn.score(X_test_filtered_scaled, y_test_filtered)

# Calculate mean cross-validation accuracies
mean_cv_accuracy_decision_tree = np.mean(cv_scores_decision_tree) * 100
mean_cv_accuracy_naive_bayes = np.mean(cv_scores_naive_bayes) * 100
mean_cv_accuracy_knn = np.mean(cv_scores_knn) * 100

# Calculate test set accuracies
test_accuracies = [test_accuracy_decision_tree * 100, test_accuracy_naive_bayes
* 100, test_accuracy_knn * 100]

# Plotting
labels = ['Decision Tree', 'Naive Bayes', 'K-NN']
x = np.arange(len(labels))

fig, ax = plt.subplots(figsize=(10, 6))

bar_width = 0.25

bars1 = ax.bar(x - bar_width / 2, [mean_cv_accuracy_decision_tree,
mean_cv_accuracy_naive_bayes, mean_cv_accuracy_knn],
        bar_width, label='Mean CV Accuracy', color='lightblue')

for bar, value in zip(bars1, [mean_cv_accuracy_decision_tree,
```

```
mean_cv_accuracy_naive_bayes, mean_cv_accuracy_knn]):
    ax.text(bar.get_x() + bar.get_width() / 2, bar.get_height() - 1,
'{:.2f}%'.format(value),
            ha='center', va='bottom', color='black')

bars2 = ax.bar(x + bar_width / 2, test_accuracies, bar_width, label='Test
Accuracy (age below 35)', color='lightcoral')

for bar, value in zip(bars2, test_accuracies):
    ax.text(bar.get_x() + bar.get_width() / 2, bar.get_height() - 1,
'{:.2f}%'.format(value),
            ha='center', va='bottom', color='black')

ax.set_xlabel('Classifiers')
ax.set_ylabel('Accuracy (%)')
ax.set_title('Comparison of Classifiers')
ax.set_xticks(x)
ax.set_xticklabels(labels)
ax.legend()

# Set the lower limit of y-axis to 50
ax.set_ylim(bottom=60)

plt.tight_layout()

# Visualization of K-NN Classifier
# Generate synthetic 2D dataset
X, y = make_classification(n_samples=100, n_features=2, n_informative=2,
n_redundant=0, n_classes=2, n_clusters_per_class=1, random_state=42)

# Create K-NN classifier
clf = KNeighborsClassifier(n_neighbors=5)
clf.fit(X, y)

# Plot decision boundary
h = 0.02  # step size in the mesh
x_min, x_max = X[:, 0].min() - 1, X[:, 0].max() + 1
y_min, y_max = X[:, 1].min() - 1, X[:, 1].max() + 1
xx, yy = np.meshgrid(np.arange(x_min, x_max, h), np.arange(y_min, y_max, h))

# Predict for each point in the mesh
Z = clf.predict(np.c_[xx.ravel(), yy.ravel()])
Z = Z.reshape(xx.shape)

# Create color map
cmap_light = ListedColormap(['#FFAAAA', '#AAFFAA'])
cmap_bold = ListedColormap(['#FF0000', '#00FF00'])

# Plot the decision boundary and training points
plt.figure(figsize=(8, 6))
plt.pcolormesh(xx, yy, Z, cmap=cmap_light)

# Plot the training points
plt.scatter(X[:, 0], X[:, 1], c=y, cmap=cmap_bold, edgecolor='k', s=20)
plt.xlim(xx.min(), xx.max())
plt.ylim(yy.min(), yy.max())
plt.title("2-Class classification (K = 5)")
plt.xlabel('Fraud')
plt.ylabel('Not Fraud')

plt.show()
```

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