

Assessment

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Module Name: Corporate Finance

Module Code: LCMB7005_LON

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Submitted on: 23nd, April, 2024

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Introduction

This article provides a brief overview of Tesla's development history, industry conditions, and main competitors. By analyzing Tesla's financial reports over the past five years, the liquidity and leverage ratios, average stock price, and return rate of Tesla were calculated to evaluate the company's financial performance. Furthermore, the article assesses Tesla's capital structure based on the capital balance theory and static financial theory. Lastly, the author introduces Tesla's largest investment activity over the past five years, the scale, feasibility, and outcomes of the Nevada Gigafactory project, concluding with a brief assessment of the current situation.

Part A

a. A brief history of Tesla

Tesla, Inc. was founded in California in 2003 by engineers Martin Eberhard and Marc Tarpenning under the original name Tesla Motors. The company was established to develop and produce fully electric vehicles. In 2004, Elon Musk invested \$30 million in the company, becoming chairman of the board, and later assumed the role of CEO in 2008. In 2006, Tesla launched its first commercial vehicle, the Roadster, achieving significant market success. Tesla faced serious financial challenges in 2009 and survived the financial crisis with loans from the U.S. Department of Energy and an IPO the following year. In 2013, fueled by the tremendous success of the Model S, Tesla reported its first profitable quarter and announced the construction of a gigafactory in Nevada the following year, which considered critical to its entire business model (Reed, 2020). By 2021, Tesla became the world's fifth company to surpass a market value of \$1 trillion (Thomas, 2021).

b. Industry

Tesla is a multinational automotive manufacturer and clean energy company, with some investors considering it a technology company as well. Tesla's mission is to accelerate the world's transition to sustainable energy. To achieve this goal, Tesla is committed to creating new products that replace some of the largest polluters on the planet. Currently, Tesla's operations include automobile manufacturing, clean energy solutions such as solar power, production of energy storage devices, and software development (Tesla, 2022c).

c. Business model

Tesla's business model is based on three pillars: sales model, service, and charging network.

Firstly, unlike other car manufacturers that sell and provide after-sales services through franchised dealers, Tesla operates to sell directly to consumers, establishing an internationally owned distribution and after-sales network, most of which are located in city centers. Tesla also utilizes the internet for sales, allowing customers to customize and purchase Tesla's online. Tesla believes that by selling directly, it can gain an advantage in product development speed and, more importantly, direct market access, creating a better customer experience. Furthermore, to address the biggest barrier to the mass adoption of electric vehicles—the issue of charging—Tesla has created and operates the world's largest fast-charging network, with over 45,000 Supercharger stations. Users can quickly find a charging station to recharge their Tesla, and the cost is only a quarter of the price of gasoline (Tesla, 2022b), (Patel, 2023).

d. Market place

In 2022, the company continued to lead the pure electric vehicle market, holding an 18% share. By 2023, it was the world's most valuable car manufacturer, ranked 69th in the Forbes Global 2000 list. From the third quarter of 2018 to the third quarter of 2023, Tesla's revenue grew from \$6.8 billion to \$23.4 billion, with an incredible compound annual growth rate of 28% (Patel, 2023). In 2023, Tesla delivered 1.81 million vehicles worldwide, a 38% increase from 2022 (Tesla, 2024), maintaining the top spot in global market share at 19.9% (Lu, 2024). However, given the increasingly fierce competition in the electric vehicle market, Tesla's market share has been declining from 72% in 2021, and it is expected to lose its position as the market leader in 2024 (Hoskins and Sherman, 2024).

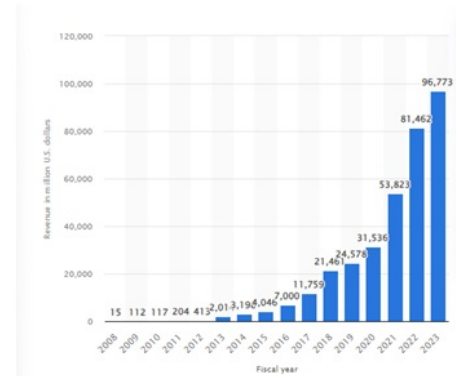


Figure 1. Tesla's revenue from FY 2008 to FY 2023 (Source: Carlier, 2024)

e. Major competitor

Tesla is currently facing some strong competitors such as Ford, General Motors, BMW, or Toyota, but the most competitive of them all is undoubtedly BYD. In the fourth quarter of 2023, BYD reached a record-breaking sales volume of 526,000 pure electric vehicles, surpassing Tesla's 484,500 electric vehicles, becoming the world's largest electric vehicle manufacturer (Hoskins and Sherman, 2024).

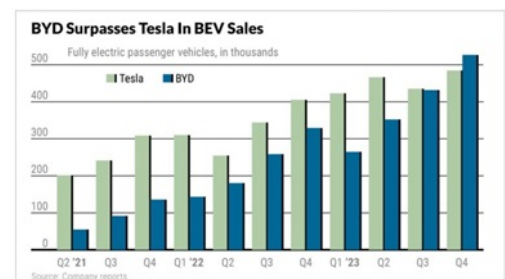


Figure 2. The sales of BYD and Tesla between 2020 Q1 to 2024 Q1 (Source: CARSON, 2024)

f. Major events over the past five years every year

In January 2023, faced with increasingly fierce market competition and challenging global economic prospects, Tesla decided to cut prices by a fifth to boost demand. In the UK, the price reductions ranged from 10% to 13%, while in the US, some models saw price cuts of up to 20%, amounting to savings of thousands of pounds. This indicates that, amid concerns over an economic slowdown, Tesla is making efforts to address the potential slowdown in car demand. Tesla's stock price hit a low again after the announcement of the price cuts (Hooker, 2023).

Starting July 27, 2022, Tesla will begin charging for its standard connectivity services for all models, reversing the old policy of free standard connectivity for the lifetime of new vehicle purchases. New Tesla Model S, 3, X, and Y vehicles ordered after July 20 will now only include eight years of standard connectivity service. After this period, if owners wish to continue using navigation and voice command services, they will need to upgrade to the company's premium connectivity level (Mullen, 2022).

In August 2022, Elon Musk sold nearly \$7 billion of Tesla stock to finance his Twitter deal. Musk was forced to sign a \$44 billion acquisition agreement for Twitter in April, with the majority of his wealth tied to Tesla stock. Despite the current slump in Tesla's stock price, Musk had to continue selling his shares to fulfill the terms of the acquisition (Hirsch, 2022).

In November 2021, Uber reached an agreement with Tesla, establishing a new partnership to fulfill the promise of electrifying all of Uber's vehicles in London by 2025. Following the agreement, Uber drivers will be able to use the Clean Air Fund to purchase or lease Tesla vehicles. An Uber spokesperson mentioned that a typical driver would have approximately 3,500 to 4,000 pounds available for switching to an electric vehicle (EV) (Sky News, 2021).

On July 1, 2020, Tesla's stock price reached a record high of \$1,134, pushing its market value to \$209.47 billion, surpassing Toyota to become the world's most valuable automaker. Despite Toyota's car sales increasing nearly 30 times last year and revenue growing over 10 times, investors showed tremendous enthusiasm for this American company, believing it could dominate the future electric vehicle market (BBC News, 2020).

Part B

a. Calculate and briefly evaluate the liquidity for the past five years

Liquidity refers to the availability of cash that can be used to meet financial obligations in the near future, considering current financial commitments. Short-term cash sources include bank deposits, cash released from selling stocks, and cash collected from customers (Weetman, 2013, pp.351). Liquidity is crucial for a company's ability to operate smoothly. Some important indicators used to measure liquidity include the current ratio, quick ratio, and cash ratio.

The current ratio compares a company's current assets to its current liabilities. A higher current ratio indicates better liquidity. However, an unreasonably high current ratio may suggest excessive funds tied up in cash or inefficiencies in fund utilization (Atrill and McInaney, 2018, pp.216–217).

Quick Ratio (Acid Test Ratio) is similar to the current ratio but measures a company's ability to repay current liabilities using only its quick assets (assets that can be quickly converted to cash) without relying on inventory sales. The generally accepted minimum level for this ratio is often stated as 1.0 (Atrill and McInaney, 2018a, pp.216–218).

Cash Ratio also known as the cash asset ratio, this indicates a company's ability to repay short-term liabilities using its cash and cash equivalents. The cash ratio is a stricter and more conservative measure compared to other liquidity ratios like the current ratio and quick ratio because it includes only cash and cash equivalents in its calculation (CFI, 2020).

Based on Tesla's five-year financial data (Appendix A) and the liquidity-related formulas (Appendix C), the liquidity metrics for Tesla are as follows:

Ratios	2023	2022	2021	2020	2019
Current Ration	1.25	1.05	1.08	1.59	0.8
Quick Ration	1.72	1.53	1.38	1.88	1.13
Cash Ration	1.03	0.84	0.92	1.38	0.61

Table1. The liquidity ratios of Tesla in last five years

From the data in Table 1, it is evident that over the past five years, Tesla has been consistently improving its liquidity, leading to a significant enhancement in the company's ability to repay debts and meet accounts payable in the short term.

b. Calculate and briefly evaluate the leverage (gearing) ratios for the past five years

Financial leverage refers to the relationship between the financing contributed by owners and that provided by others in the form of loans. This relationship is significant because the level of debt affects the associated risk level of a business. The debt-to-equity ratio helps reveal the extent of financing through borrowing and its impact on the risk level borne by the company (Atrill and McInaney, 2018b, p.264).

The debt-to-equity ratio measures the risk to a company from the perspectives of both existing and potential lenders. The primary risk for a company is the obligation to pay debt in the form of fixed costs of principal and interest, even if the company's business and cash flow decline. Another risk faced by the company is that a decrease in its ratio could result in a breach of its loan agreements. This could lead to higher interest rates or, worse, banks demanding immediate repayment of the loan (Fields, 2016, p.136).

The debt-to-capital ratio is a measure of total debt compared to total capital and serves as an indicator of risk. Generally, a higher debt-to-capital ratio signifies greater risk for a company, indicating that its earnings may not be sufficient to cover the costs of its debt and other liabilities. However, a higher debt-to-capital ratio is not always negative; some companies prefer to use loans or other forms of debt to fund almost all of their operations as this can reduce tax burdens (Tamplin, 2023).

The debt to asset ratio is the ratio of total financing debt (including both current and long-term portions) to total company assets. This ratio helps understand the extent to which a company's operations are funded by debt. Generally, a ratio close to 1 indicates a very high level of debt financing, which may raise concerns about the company's solvency (Peterdy, 2020).

Based on Tesla's five-year financial data (see Appendix A) and the relevant formulas for leverage ratios (see Appendix C), we can derive Tesla's leverage ratio over the past five years.

Ratios	2023	2022	2021	2020	2019
Debt-Equity Ratio	0.10	0.08	0.22	0.47	1.69
Debt-to-Capital Ratio	0.09	0.08	0.18	0.32	0.63
Total Debt to Total Assets	0.06	0.05	0.11	0.21	0.37

Table2. The leverage ratios of Tesla in last five years

From the data in Table 2, it is evident that Tesla is making significant efforts to reduce the company's leverage ratio, especially the debt-to-equity ratio, which has shown considerable improvement. This indicates that Tesla, after a period of rapid expansion, is transitioning towards more stable operations and actively reducing financial risks by controlling leverage levels to a healthy range.

c. A critical analysis of the corporation's financial performance

A company's financial performance refers to its ability to generate profits and increase shareholder value, serving as indicators to measure how effectively the company manages resources and achieves financial objectives. Some key financial performance indicators include revenue growth, profit margins, return on investment, and other financial ratios. To assess a company's financial condition, the 10-K filing is a critical reference, which includes the balance sheet, income statement, and cash flow statement. Through the 10-K filing, specific financial ratios can be calculated and analyzed to gain insights into the company's financial condition and performance (Lenglet, 2023).

Based on Tesla's financial reports over the past five years (see Appendix A), from 2020 to 2023, Tesla's revenue growth rates were 70.67%, 51.35%, 18.8%, and 3.49%, indicating that Tesla experienced significant revenue leaps until 2022 when it entered a phase of slower growth. However, during this period, Tesla's gross profit margins were 105.22%, 53.26%, -15.31%, and -23.18%, indicating a rapid decline in profit margins, likely influenced by intensifying competition in the electric vehicle market and economic conditions, which have had a significantly negative impact on Tesla.

Nevertheless, due to Tesla's maturing operations and successes in the energy storage and generation sectors with a 10% growth rate (Ali, 2024b), Tesla's net income performance remains remarkable. From 2020 to 2023, Tesla's net income growth rates were 700.58%, 127.79%, 19.2%, and 113.09% (Macrotrends, 2022). Over the past 5 years, Tesla's electric vehicle production and deliveries have grown by over 500%, while its energy storage business has seen nearly 900% growth, thanks to the successful operation of the Nevada Gigafactory, with deliveries increasing from 1.65 GWh in 2019 to 14.7 GWh in 2023, a 125% increase just in 2023, achieving a transformative development from losses to a \$500 million annual profit.

Tesla's operating profit margin also grew from a negative -0.3% in 2019 to 9.2% in 2023. The year 2022 was the best year for Tesla, with an operating profit margin of approximately 17% (Ali, 2024a). Despite facing numerous challenges and issues, the data indicates that Tesla's future prospects and profitability remain one of the top choices for investors.

d. Compare the financial ratios calculated above to the ratios of major competitor, commenting on similarities or differences

BYD (Build Your Dreams) is a Chinese technology company founded in 1995, with over 30 industrial parks established globally. It primarily focuses on research and development, as well as production of new energy vehicles, dedicated to providing zero-emission energy solutions (BYD Global, n.d.). BYD is listed on the stock exchanges in China and Hong Kong and has seen significant growth in performance since 2020, emerging as one of Tesla's strongest competitors in the electric vehicle sector. It is projected that BYD may surpass Tesla in both production and sales in 2024 (CARSON, 2024).

Based on BYD's five-year financial data (see Appendix B) and the relevant formulas for liquidity and leverage ratios (see Appendix C), we can determine BYD's liquidity ratios and leverage ratios over the past five years.

Ratios	2023	2022	2021	2020	2019
Quick Ration	0.49	0.72	0.75	0.75	0.76
Cash Ration	0.22	0.33	0.14	0.12	0.11
Current Ration	0.72	0.97	1.05	0.99	0.99

Table3. The liquidity ratios of BYD in last five years

Ratios	2023	2022	2021	2020	2019
Debt-Equity Ratio	0.11	0.15	0.45	0.46	0.32
Debt-to-Capital Ratio	0.10	0.13	0.31	0.32	0.24
Total Debt to Total Assets	0.03	0.05	0.14	0.14	0.09

Table4. The leverage ratios of BYD in last five years

Based on the data from Table 3 and Table 4, it is observed that BYD's liquidity and leverage ratios have remained relatively stable over the past five years. BYD's liquidity experienced a slight decrease in 2023, with the quick ratio and cash ratio decreasing by 31.9% and 33.3%, respectively, compared to 2022. Compared to Tesla's data (Table 1, Table 2), BYD's liquidity levels are notably low. In 2023, Tesla's cash ratio was 20 times that of BYD.

In terms of leverage ratios, due to Tesla's emphasis on reducing debt over the past five years, by 2023, Tesla's debt levels had decreased to a relatively robust range, similar to BYD. In 2023, the Debt-Equity Ratios for Tesla and BYD were 0.10 and 0.11, respectively, and the Debt-to-Capital Ratios were 0.09 and 0.10, respectively. However, in terms of Total Debt to Total Assets, Tesla's ratio was 0.06, which is twice that of BYD. This may be attributed to a significant 53.5% growth in BYD's Total Assets in 2023; thereby improving the data (see Appendix B).

Overall, as major competitors in the automotive industry, both companies demonstrate a similar level of risk control in their financial performance. Tesla's liquidity is notably stronger, likely due to its higher profit margins, providing Tesla with better risk resilience and options when facing unexpected risks.

e. Briefly review a capital structure theory of your choice, drawing on published research

Capital structure theory is an important theory in the field of financial management, focusing on how companies choose the optimal capital structure to maximize shareholder wealth. The capital structure of a company refers to the sum of all liabilities and all equities, typically the sum of the credit side of the balance sheet. Capital structure theory predominantly concerns itself with measuring overall corporate risk through metrics such as the ratio of total liabilities to equity (Schwartz, 1959). Some important theories within capital structure include the trade-off theory and the static trade-off theory.

The trade-off theory of capital structure suggests that companies should determine the optimal mix of debt and equity financing to balance the returns and costs associated with each source, while considering factors such as the company's risk profile, expected future cash flows, and the tax implications of each financing source. The trade-off theory of capital structure helps traders and investors assess the valuation of stocks as part of fundamental analysis. By understanding this theory, one can identify the optimal capital structure for a company and calculate its theoretical value (McCall, 2021).

The static financial theory primarily concerns the relationship between corporate value and capital structure. One of the most well-known theories in static financial theory is the Modigliani-Miller theorem, which posits that capital structure has no impact on the value of a company. The Modigliani-Miller theorem was originally proposed in a no-tax environment. Under this assumption, the value of a company is unaffected by its capital structure; whether a company uses debt financing or equity financing, the value of the company remains the same. Additionally, investors can buy and sell securities at any time without any costs or restrictions, and companies can obtain debt and equity capital at the same cost. According to the Modigliani-Miller theorem, investors can adjust capital structure through their own portfolios to achieve the desired structure (Suthar, 2024).

f. Comment on your selected company with respect to your selected capital structure theory

Analyzing Tesla's capital structure through the Trade-off Theory, we can consider several factors. Firstly, as a high-tech and high-growth company, Tesla's significant research and investment expenditures may generate noticeable interest tax shields. Debt financing allows Tesla to leverage this advantage, overall reducing tax burdens, which is a positive factor. However, despite the tax benefits of debt, it also increases the company's financial risk. Tesla operates in a market environment with high uncertainty and volatility, which may increase the potential risk of bankruptcy.

Secondly, Tesla, in its rapid expansion phase, requires substantial funding support, necessitating adequate

liquidity to flexibly address potential capital needs at any time. While utilizing bond financing, it is essential to pay extra attention to reducing financial risk to cope with unforeseen circumstances.

Lastly, according to the Trade-off Theory, Tesla's optimal capital structure should strike a balance between maximizing tax advantages and minimizing bankruptcy risk. While leveraging debt, it is crucial to consider the high risks associated with high growth and cautiously manage to avoid excessive financial risk.

If we apply the static financial theory to evaluate Tesla's capital structure choice, we can consider factors such as costs, tax implications, and financial flexibility. First, from a cost perspective, Tesla has frequently been in a loss-making position in recent years, and debt financing may increase its financial burden. As a high-growth company, Tesla's future profitability is relatively uncertain, which could result in higher costs of debt financing. Secondly, given Tesla's frequent losses in recent years and the uncertainties associated with its expansion, debt financing may not fully leverage tax advantages. Additionally, changes in U.S. government subsidies and tax incentives for the electric vehicle industry could impact Tesla's debt financing strategy. Thirdly, as a high-tech company, Tesla may need to maintain high financial flexibility to adapt to rapidly changing market and technological environments. Therefore, the company may lean towards reducing financial risk and maintaining flexibility. However, this choice could also be influenced by market conditions, government policies, and the company's own financial situation.

g. Average annual share returns for the past five years

Based on Tesla's monthly stock prices over the past five years, we can calculate Tesla's average annual stock price and annual return rate as follows:

Date	Close	Yearly average (Average of 12 months)	Return
2024/3/1	179.83	222.01	-2.67%
2023/3/1	207.46	228.11	-21.14%
2022/3/1	359.20	289.25	87.58%
2021/3/1	222.6433	154.20	551.46%
2020/3/1	34.93333	23.67	14.73%

Table5. Tesla's average stock price and return over the past five years

(Source: uk.finance.yahoo.com, 2024)

Based on the data from Table 5, we can plot the trend of Tesla's average annual stock price and return rate over the past five years.

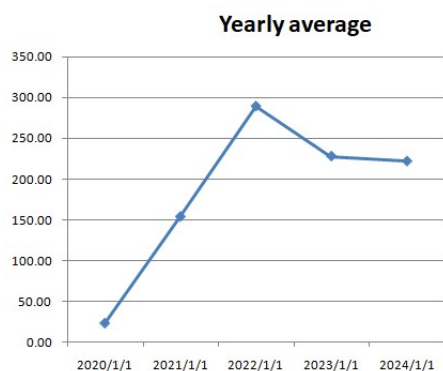


Figure 3 Tesla's years average in last five years



Figure 4 Tesla's return in last five years

(Source: Table5)

(Source: Table 5)

Based on the trend chart, it is evident that Tesla experienced rapid stock price growth from 2020 to 2022. This was primarily driven by Tesla's annual revenue growth rates of 28.3%, 70.6%, and 51.3% from 2019 to 2022 (see Appendix A). The astonishing stock return rate of 551.46% from 2020 to 2021 may be attributed to the significant market success of Tesla's Model 3 in 2020. In 2020, the Model 3 was the best-selling electric vehicle globally, with sales exceeding 360,000 units. Tesla captured 79% of the U.S. pure electric vehicle market share and 16% of the global electric vehicle market share (Lindner, 2023). However, in the subsequent three years, Tesla faced intense competition in the electric vehicle market, challenging its market share. Additionally, Tesla's profit margins declined, leading to a decrease in its stock price.

Tesla's stock return rate sharply declined to -21.14% in 2023. This decline could also be attributed to actions such as multiple interest rate hikes by the Federal Reserve to combat inflation, an overall challenging economic environment, and Elon Musk's substantial sale of Tesla stock to fund the acquisition of Twitter.

Part C. Tesla's largest investment activity during the past five years

a. Purpose, aims and expected outcomes of the investment

Tesla pioneered the concept of Gigafactories as a cornerstone of its business strategy. The purpose of constructing Gigafactories is to manufacture batteries, electric vehicle components, and renewable energy products at an unprecedented scale while minimizing production costs and maximizing efficiency. Building Gigafactories aligns with Tesla's vertical integration strategy, allowing maximal utilization of Tesla's technological innovations and enabling rapid global expansion. Establishing Gigafactories in key sales markets reduces transportation and production costs, lowers trade barriers, and caters to local markets.

Tesla began investing in and constructing Gigafactories globally since 2013, with six Gigafactories established to date. The first and longest-standing Gigafactory is located in Nevada, USA. The Tesla Gigafactory in Nevada was initiated in 2014 and commenced operations in 2016. Spanning 2,900 acres and employing approximately 20,000 staff, it is the largest factory in the world by footprint. Tesla aims to make the Nevada Gigafactory one of the highest-volume electric motor, energy storage, power train, and battery factories globally, with plans to produce billions of batteries and half a million electric vehicles annually in the future.

b. Investment scale and financing

The Tesla Gigafactory in Nevada consists of two large factories. The initial investment was \$6.2 billion, followed by an additional \$3.6 billion investment to construct a new battery factory and a Semi truck factory for the production of fully electric trucks (Tesla, 2023).

When Tesla began planning its Gigafactory in 2014, it actively sought external technological and financial support. Initially, Tesla attracted competition among Texas, Arizona, New Mexico, and Nevada by offering tax incentives, tax breaks, cash subsidies, or other incentives when selecting the site for the Gigafactory. Faced with the substantial and ongoing construction costs of the Gigafactory, these direct economic subsidies and tax relief policies were crucial sources of funding and bargaining chips for Tesla. Ultimately, Nevada emerged victorious with an incentive package valued at nearly \$1.3 billion (including exemptions from sales tax on equipment and building materials, full exemption from personal and real property taxes, exemptions from consumption taxes, transferable tax credits, and discounted electricity), along with TRIC owners' commitment to provide Tesla with nearly 1,000 acres of land for free use (WESOFF, 2014), (Hidalgo, 2014).

In March 2023, Nevada approved a new package of tax incentives worth over \$330 million to attract and support Tesla's continued investment in the Nevada Gigafactory (RITTER, 2023).

Additionally, Tesla turns to Panasonic Energy, its primary partner in the battery sector, for help. The two parties reached an agreement for Panasonic Energy to lead the battery production at Tesla's Nevada Gigafactory. Panasonic financed \$3.86 billion through bonds in 2016, with a significant portion allocated to the construction of the Nevada Gigafactory (Trudell and Horie, 2015).

The total investment scale of the Nevada Gigafactory has reached \$9.8 billion, with a significant portion financed by Tesla through bond issuance, in addition to government support and investments from partners. Due to the extensive Gigafactory project, Tesla's total debt soared from \$1.8 billion in the fourth quarter of 2013 to \$11 billion by 2018. Concurrently, Tesla delayed payments to suppliers, and by 2018, Tesla's accounts payable had raised to \$3.6 billion, four times the amount in 2015. Extensive cash investments led to a surge in Tesla's debt, severe cash flow shortages, and posed significant financial risks (SEC, 2018), (Chan and Burns, 2018).

c. Investment feasibility

Investment feasibility refers to a comprehensive and systematic study and evaluation of potential economic benefits, technical solutions, legal environment, market prospects, funding arrangements, and other aspects before the implementation of a large-scale investment project to determine whether the investment is worthwhile. Investment feasibility studies are an important risk management tool that ensures investments yield expected returns, avoid unnecessary economic losses, and minimize risks associated with unexpected costs. There are four main elements of investment feasibility: technical feasibility, financial feasibility, market feasibility, and operational feasibility (Martins, 2023).

The investment feasibility analysis of the Tesla Gigafactory in Nevada is as follows:

Technical Feasibility: Tesla holds a leading advantage in electric vehicle and energy storage technologies. The primary objective of establishing the Nevada Gigafactory is to enhance production efficiency and reduce costs. To achieve this goal, the Nevada Gigafactory adopts cutting-edge production technologies and automation equipment, while seeking top-notch partners globally. Panasonic Energy from Japan holds a leading position in the research and production of lithium batteries. As Tesla's primary battery supplier, Panasonic Energy invested in the early construction phases of the Nevada Gigafactory and leads its battery production. Both parties have signed a long-term cooperation agreement focused on achieving the highest energy density and optimal performance for next-generation electric vehicle batteries, thereby extending the lifespan of electric vehicles (Panasonic, 2013). Additionally, research and production efforts for recycling and reusing old batteries are conducted at the Nevada Gigafactory (Tesla, 2014).

Financial Feasibility: The construction investment for the Nevada Gigafactory is substantial, with Tesla having invested nearly \$10 billion in building and expanding two factories. This significant capital requirement has imposed unprecedented pressure on Tesla. Therefore, in terms of financing, Tesla first sought support from the local government, receiving over \$1.63 billion in direct subsidies from the Nevada state government and a package of tax incentives (WESOFF, 2014). Tesla also obtained the right to use approximately 1,000 acres of land free of charge, significantly alleviating the investment pressure during the initial construction phase. Tesla's partner, Panasonic Energy from Japan, contributed approximately \$3 billion to the construction of the Nevada Gigafactory through bond issuance (Trudell and Horie, 2015). Ultimately, Tesla raised the primary funds for building the Gigafactory by extensively issuing bonds in the public market.

Market Feasibility: Since Tesla introduced its first commercial model, the Roadster, in 2006 and achieved significant success, the electric vehicle market has experienced explosive growth. As a leader in the electric vehicle industry, Tesla has consistently held the top position in electric vehicle production and sales (Patel, 2023). Considering the increasing global demand for sustainable transportation energy and government subsidies for electric vehicles, the market for electric vehicles and high-performance batteries is expected to continue growing. However, competition in the electric vehicle and battery industries is intensifying, requiring Tesla to maintain a competitive advantage through its technological innovation and brand influence. Additionally, the United States remains Tesla's largest single market, and building Gigafactories in Nevada helps Tesla solidify and expand its market position in the U.S., while reducing transportation and sales costs.

Operational Feasibility: Gigafactories are fundamental to Tesla's development strategy. The Tesla Gigafactory model offers significant advantages due to economies of scale. Additionally, Gigafactories feature streamlined production processes and cutting-edge automation technology, allowing for rapid and efficient production of large quantities of batteries. Moreover, the design of Gigafactories is scalable, enabling easy adjustment of production volumes to meet changing market demands. To achieve this, Tesla has assembled an experienced management team to oversee Gigafactory construction projects.

As a renewable energy company, Tesla emphasizes minimizing environmental impact during construction and operation. The design goal of Gigafactories is to achieve energy self-sufficiency by harnessing solar, wind, and geothermal energy to power the entire factory. This forward-thinking design approach, while increasing initial investment costs, significantly reduces energy consumption and expenditure during production (Roger Andrews, 2018).

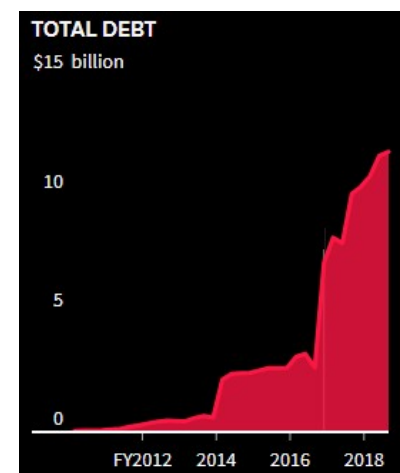


Figure5. Tesla's total debt from 2012 to 2018
Source: (Chan and Burns, 2018)

The Tesla Gigafactory plan also carries some risks. Firstly, Tesla faces financial pressures due to the massive construction expenses of Gigafactories, leading to significant debt accumulation. From 2014 to 2018, Tesla's debt increased more than fourfold, with the company's cash reserves totaling less than \$2 billion. Due to cash shortages, the expansion project of the Nevada Gigafactory was delayed by 3 years before being implemented (Lambert, 2024). Furthermore, Tesla's global investment in constructing six Gigafactories has posed significant challenges to its balance sheet, highlighting the importance of carefully considering Tesla's financial risks. Secondly, Tesla's electric vehicle market faces increasingly fierce competition, with numerous emerging electric vehicle brands and powerful traditional automakers shifting towards electric vehicles, posing serious challenges to Tesla's market share. If demand for Tesla's electric vehicles and batteries were to decline, or if the market shifted towards small-scale production, it would become challenging to sustain such large-scale factories. Additionally, Nevada is currently the primary production site for Tesla's batteries and a recycling facility for used batteries. The technology for lithium battery recycling and reuse is still immature, with lingering safety concerns. No one can guarantee flawless handling of used batteries, posing a potential challenge that operation managers of Gigafactories should be prepared to address at any time (Tesla, 2022). Certainly, during the construction and operation of Gigafactories, Tesla also faces various legal, environmental, and other challenges that add complexity to its operations.

In summary, the construction of Tesla's Gigafactory in Nevada faces challenges in terms of funding,

technology, and market dynamics. However, in the long run, the investment feasibility is positive. Through this project, Tesla can not only strengthen and enhance its market competitiveness but also contribute to the development of sustainable transportation solutions.

d. Current outcome of investments

Tesla is committed to transforming the Gigafactory in Nevada into one of the world's largest production facilities for electric motors, energy storage products, automotive power trains, and batteries, with plans to produce billions of batteries and half a million electric vehicles annually (Tesla, 2023b). Their goal is to build a factory capable of producing 35 GWh of batteries per year, a forecasted output that was groundbreaking at the time, exceeding the total global battery production of 2013 (Tesla, 2023a). By 2023, the Gigafactory in Nevada had achieved an annual battery production capacity of 37 GWh, directly creating 14,000 operational jobs and 17,000 construction jobs (Tesla, 2023a), improving local public services and infrastructure, and providing broader possibilities for Tesla's future development. This success demonstrates the foresight of the Gigafactory initial planning and design.

However, due to the continuous investment phase and the impact of the COVID-19 pandemic, the Gigafactory did not achieve profitability until 2020. Encouraged by the performance growth of the Gigafactory, Tesla announced in 2023 an investment of \$3.6 billion for significant expansion based on the existing Gigafactory, including the construction of a production line capable of assembling approximately 50,000 Tesla Semi electric trucks annually (Kane, 2023), and a battery factory with an annual capacity of 100 GWh, providing power for 2 million light electric vehicles (Kolodny, 2023). Tesla plans to achieve an annual production capacity of 200 GWh at the Nevada Gigafactory by 2031 to solidify its competitive advantage and address the rapid growth in demand for electric vehicles (Kelly, 2023).

Conclusion

As a leader in the global electric vehicle industry, Tesla has faced intense competition and challenges in recent years. The author analyzed Tesla's liquidity and leverage ratios based on its financial statements over the past five years, assessing its financial performance. Despite production and sales breakthroughs in recent years, Tesla has experienced significant declines in market share and profit margins. Similarly, Tesla's average annual stock price and return rate have shown negative growth since 2022, indicating market concerns about its future prospects. Tesla's gigafactory strategy has played a crucial role in its diversification, but it has also imposed significant financial pressure due to Tesla's substantial debt and declining profit margins. Considering Tesla's high debt levels and reduced profit margins, the company should cautiously manage its leverage ratio to mitigate financial risks.

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Appendix A. Tesla's financial results for the last five years (Wall Street Journal, 2023)

Income Statement:	31/12/2023	31/12/2022	31/12/2021	31/12/2020	31/12/2019
	\$ (Millions)	\$ (Millions)	\$ (Millions)	\$ (Millions)	\$ (Millions)
Revenue:	96,773.00	81,462.00	53,823.00	31,536.00	24,578.00
Operating Profit / (Loss):	8,891.00	13,656.00	6,523.00	1,994.00	-69
Net Income	14999	12583	5524	690	-862
Gross Profit	17660	20853	13606	6630	4069
Profit Before Tax:	9,973.00	13,719.00	6,343.00	1,154.00	-665
Profit after tax from continuing operations:	14,974.00	12,587.00	5,644.00	862	-775
Basic:	473.00¢	402.00¢	187.02¢	24.67¢	-32.67¢
Diluted:	n/a	n/a	n/a	n/a	n/a
Adjusted:	473.00¢	402.00¢	187.02¢	24.67¢	-32.67¢
Dividend per Share:	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Balance Sheet:	31/12/2023	31/12/2022	31/12/2021	31/12/2020	31/12/2019
Assets:	\$ (Millions)	\$ (Millions)	\$ (Millions)	\$ (Millions)	\$ (Millions)
Non-Current Assets:	45,784.00	30,897.00	35,031.00	25,431.00	22,206.00
Property, Plant & Equipment:	33,905.00	26,111.00	20,900.00	14,305.00	20,199.00
Intangible Assets:	615	593	1,717.00	520	537
Cash & Short Term Investments	29,637.00	22,479.00	18,052.00	19,622.00	6,514.00
Cash Only	16941	16547	17921	19622	6514
Other Non-Current Assets:	11,264.00	4,193.00	12,414.00	10,606.00	1,470.00
Total Current Assets:	49616	40917	27100	26717	12103
Inventories:	13,626.00	12,839.00	5,757.00	4,101.00	3,552.00
Cash at Bank & In Hand:	16,398.00	16,253.00	17,576.00	19,384.00	6,268.00
Other Current Assets:	2,845.00	2,647.00	1,378.00	1,108.00	713.00
Total Assets:	106,618.00	82,338.00	62,131.00	52,148.00	34,309.00
Liabilities:					
Current Liabilities:	28,748.00	26,709.00	19,705.00	14,248.00	10,667.00
Borrowings:	2,373.00	1,502.00	1,589.00	2,132.00	1,785.00
Other Current Liabilities:	28,748.00	26,709.00	19,705.00	14,248.00	10,667.00
Net Current Assets:	49,616.00	40,917.00	27,100.00	26,717.00	12,103.00
Long-Term Debt	6,528.00	3,761.00	6,916.00	10,888.00	12,627.00
Non-Current Liabilities:					
Borrowings:	2,857.00	1,597.00	5,245.00	9,556.00	11,634.00
Other Non-Current Liabilities:	11,404.00	8,134.00	5,598.00	4,614.00	3,898.00
Other Liabilities:	242	409	568	655	643
Total Liabilities:	43,251.00	36,849.00	31,116.00	29,073.00	26,842.00
Net Assets:	63,367.00	45,489.00	31,015.00	23,075.00	7,467.00
Capital & reserves:					
Shareholders' Funds:	62,634.00	44,704.00	30,189.00	22,225.00	6,618.00
Minority Interests / Other Equity:	733	785	826	850	849
Total Equity:	63,367.00	45,489.00	31,015.00	23,075.00	7,467.00

Appendix B. BYD's financial results for the last five years (WSJ, n.d.)

Income Statement:	31/12/2023	31/12/2022	31/12/2021	31/12/2020	31/12/2019
	HKD(Millions)	HKD(Millions)	HKD(Millions)	HKD(Millions)	HKD(Millions)
Revenue:	479,772.00	256,840.00	173,547.00	143,075.00	151,502.00
Non Operating Income/Expense	1,755.00	1,778.00	440.00	334.00	3,735.00
Pretax Income	25,311.00	5,620.00	7,944.00	3,236.00	5,461.00
Gross Income	66,779.00	27,443.00	29,162.00	19,611.00	20,880.00
Cost of Goods Sold (COGS) incl.D&A	412,993.00	229,396.00	144,385.00	123,464.00	130,622.00
Balance Sheet:	31/12/2023	31/12/2022	31/12/2021	31/12/2020	31/12/2019
	HKD(Millions)	HKD(Millions)	HKD(Millions)	HKD(Millions)	HKD(Millions)
Assets:					
Net Property, Plant & Equipment	222,385.00	115,830.00	73,085.00	68,065.00	61,543.00
Total Investments and Advances	24,853.00	13,628.00	8,613.00	6,853.00	6,107.00
Cash & Short Term Investments	80,948.00	68,702.00	17,957.00	14,189.00	14,885.00
Cash Only	57,789.00	61,722.00	17,127.00	14,150.00	14,884.00
Inventories	88,817.00	53,034.00	37,225.00	28,604.00	30,026.00
Other Non-Current Assets:	3,047.00	1,104.00	129.00	464.00	315.00
Total Current Assets:	270,360.00	203,197.00	132,324.00	119,652.00	131,339.00
Other Current Assets	11,342.00	7,129.00	5,187.00	4,175.00	4,888.00
Long-Term Note Receivable	1,655.00	1,528.00	2,220.00	1,461.00	2,525.00
Total Investments and Advances	24,853.00	13,628.00	8,613.00	6,853.00	6,107.00
Other Current Assets:	3,047.00	1,104.00	129.00	464.00	315.00
Total Assets:	557,196.00	362,922.00	239,130.00	219,439.00	222,896.00
Liabilities:					
Total Liabilities:	420,907.00	229,922.00	161,318.00	151,833.00	155,934.00
Current Liabilities:	374,259.00	209,550.00	126,189.00	120,841.00	133,163.00
Common Equity (Total)	124,657.00	116,295.00	66,135.00	58,578.00	58,503.00
Total Shareholders' Equity	124,657.00	116,295.00	66,135.00	58,578.00	58,503.00
Total Equity	136,289.00	127,518.00	75,121.00	65,110.00	64,770.00
Long-Term Debt	14,922.00	18,505.00	33,597.00	30,045.00	20,737.00
Non-Current Liabilities:					
Common Equity (Total)	124,657.00	116,295.00	66,135.00	58,578.00	58,503.00
Retained Earnings	45,969.00	32,363.00	28,997.00	23,553.00	23,375.00
Other Current Liabilities	197,450.00	81,668.00	30,998.00	19,602.00	21,997.00
Total Liabilities:	420,907.00	229,922.00	161,318.00	151,833.00	155,934.00
Cash Flow:	31/12/2023	31/12/2022	31/12/2021	31/12/2020	31/12/2019
	HKD(Millions)	HKD(Millions)	HKD(Millions)	HKD(Millions)	HKD(Millions)
Net Income before Extraordinariness	20,598.00	4,781.00	6,758.00	2,403.00	4,212.00
Net Operating Cash Flow	163,927.00	79,073.00	51,032.00	16,519.00	14,638.00
Net Investing Cash Flow	-140,389.00	-54,967.00	-16,507.00	-23,755.00	-16,944.00
Cash Dividends Paid - Total	-355.00	-510.00	-184.00	-631.00	-456.00

Appendix C. Equations (LCMB7002 Financial Management, 2023)

Liquidity ratios		
7	Quick Ratio	$\frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}}$
8	Cash Ratio	$\frac{\text{Cash}}{\text{Current Liabilities}}$
9	Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$
Leverage(Gearing) ratios		
10	Debt-Equity Ratio	$\frac{\text{Total Debt}}{\text{Total Equity}}$
11	Debt to Capital Ratio	$\frac{\text{Total Debt}}{\text{Total Equity} + \text{Total Debt}}$
12	Debt to Assets Ratio	$\frac{\text{Total Debt}}{\text{Total Assets}}$