In [1]:
```
#pip install yfinance
#pip install yfinance pandas matplotlib
```

"The Impact of Electric Cars on the Gasoline Car Market."

Hypothesis:

The widespread adoption of electric cars will lead to a significant reduction in the demand for gasoline cars, resulting in a noticeable decline in the gasoline car market share over time.

Reasearch question

1.How does the stock market correlation data reflect the impact of the electric vehicle sector's growth on traditional gasoline-powered automobile manufacturers?

2.How do investment trends differ between EV companies and traditional car manufacturers, as indicated by trading volumes on Yahoo Finance?

3.How has the rise of EVs affected the sales and market share of gasoline cars in recent years?

collect data from yahoo finance

In [2]:
```
import pandas as pd
import yfinance as yf
import matplotlib.pyplot as plt
import seaborn as sns

tickers = ['TSLA', 'NIO', 'LCID', 'LI', 'XPEV','BYD', 'MBG.DE', 'N
```

cleaning data from yahoo finance

In [3]:
```
data = {ticker: yf.download(ticker, start="2020-01-01", end="2023-

for ticker, df in data.items():
    print(f"Ticker: {ticker}")

    missing_values = df.isnull().sum()
    print("Missing values:\n", missing_values)
    print("Data types:\n", df.dtypes)
    print("\n")
```

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Ticker: TSLA
Missing values:
 Open         0
High          0
Low           0
Close         0
Adj Close     0
Volume        0
dtype: int64
Data types:
```

How does the stock market correlation data reflect the impact of the electric vehicle sector's growth on traditional gasoline-powered automobile manufacturers?

In [4]:
```
start_date = '2020-01-01'
end_date = '2023-12-31'

# Fetching the stock data
stock_data = yf.download(tickers, start=start_date, end=end_date)

# Use only closing prices
```

```
closing_prices = stock_data['Close']

# Calculate daily returns
daily_returns = closing_prices.pct_change()

# Drop any NaN values that may have been generated
daily_returns = daily_returns.dropna()

# Plotting the heatmap
plt.figure(figsize=(12, 8))
sns.heatmap(daily_returns.corr(), annot=True, cmap='coolwarm')
plt.title('Heatmap of Daily Stock Returns Correlation')
plt.show()
```

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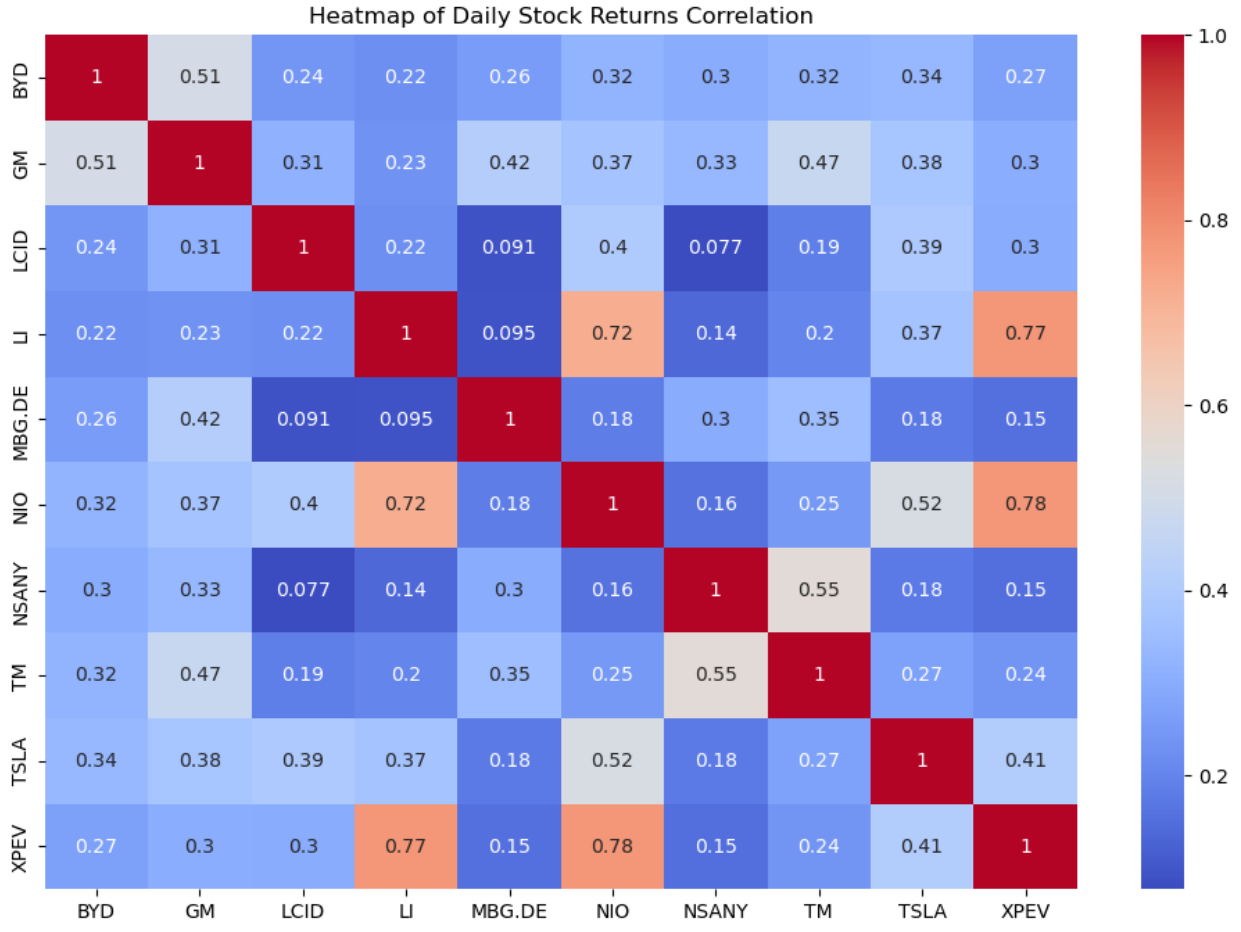

The financial interactions between traditional gasoline-powered automobile manufacturers and electric vehicle (EV) companies are depicted in the heatmap of stock return correlations. Strong positive correlations amongst EV businesses such as NIO, XPEV, and LI indicate that the rapidly growing EV market frequently moves in lockstep, perhaps in response to news from the industry, developments in technology, or changes in investor sentiment toward renewable energy. On the other hand, there is variation in the correlations between these EV stocks and traditional automakers such as GM and TM, suggesting a less consistent reaction to shifts in the market.This may indicate how the market perceives the EV industry as a promising growth area, possibly at the expense of sales of conventional gasoline-powered vehicles. The heatmap highlights the complicated competitive dynamics as the automotive industry pivots towards electrification, even while it does not reveal a clear negative link. It does, however, suggest that the rise of EVs has a nuanced impact on the valuation of established gasoline vehicle firms.

How do investment trends differ between EV companies and traditional car manufacturers, as indicated by trading volumes on Yahoo Finance?

In [5]:
```
years = [2020, 2021, 2022, 2023]

total_volumes = pd.DataFrame(index=tickers, columns=years)

for ticker in tickers:
    for year in years:
        stock_data = yf.download(ticker, start=f'{year}-01-01', e
        total_volume = stock_data['Volume'].sum()
        total_volumes.at[ticker, year] = total_volume

total_volumes
```

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Out[5]:

	2020	2021	2022	2023
TSLA	57009787500	20667337800	21821019600	32157131400
NIO	27620985400	17013109000	15166162800	11559110300
LCID	89985700	10222033500	6071685800	7370044500
LI	2033105000	3255233400	2771773700	1564610500
XPEV	2212899900	3700656700	4551656000	3588695400
BYD	488019100	299063500	270279700	196804600
MBG.DE	1351372204	780221062	766570126	584210524
NSANY	41856000	25755400	32584300	18644300
GM	3880863500	4815837800	4145001600	3499522000
TM	53758200	70869800	65143900	64700000

In [6]:

```
start_date = '2020-01-01'
end_date = '2023-12-31'

volume_data = {}

for ticker in tickers:
    stock_data = yf.download(ticker, start=start_date, end=end_da
    volume_data[ticker] = stock_data['Volume']

plt.figure(figsize=(14, 7))

for ticker in tickers:
    plt.plot(volume_data[ticker].index, volume_data[ticker].cumsu

plt.title('Total Trading Volume')
plt.xlabel('Date')
plt.ylabel('Total Volume')
plt.legend()
plt.show()
```

```
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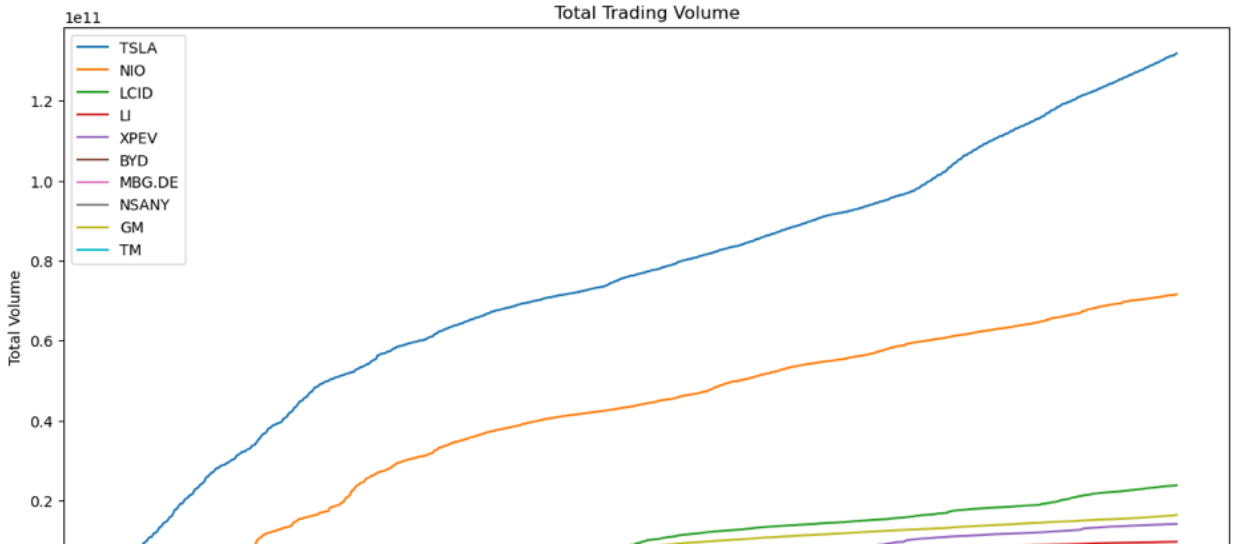
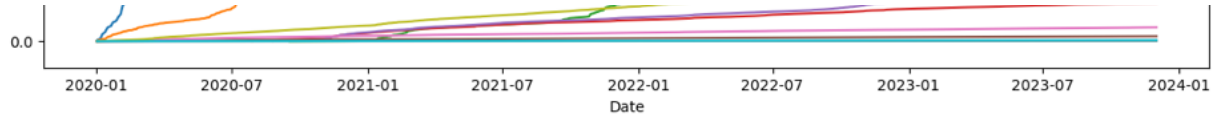




Total trading volume for a company is all about how many of its shares are traded during a certain time. Investors really pay attention to this because it shows how much action there is with that stock and how interested people are in it. It's not about how much money the company makes or its profits, but more about what's happening with its shares in the stock market.

As you can see from the graph, in the past three years, the top three companies with the highest total trading volumes are in the electric vehicle (EV) sector. This shows a significant shift in investor interest towards EV companies over traditional gasoline ones. The high trading volumes for these EV companies reflect a growing trend and an increased focus on the potential and future of electric vehicles in the market.

collect data from each company website

source data:

https://ir.tesla.com/press-release/tesla-vehicle-production-deliveries-and-date-financial-results-webcast-third-quarter-2023 (https://ir.tesla.com/press-release/tesla-vehicle-production-deliveries-and-date-financial-results-webcast-third-quarter-2023)

https://ir.nio.com/news-events/news-releases (https://ir.nio.com/news-events/news-releases)

https://ir.lucidmotors.com/news-releases/news-release-details/lucid-announces-q3-production-deliveries-sets-date-third-quarter (https://ir.lucidmotors.com/news-releases/news-release-details/lucid-announces-q3-production-deliveries-sets-date-third-quarter)

https://www.press.bmwgroup.com/usa/article/detail/T0437448EN_US/bmw-of-north-america-reports-q3-2023-u-s-sales-results?language=en_US#:~:text=BMW%20delivered%2013%2C079%20battery%20electric,volume% (https://www.press.bmwgroup.com/usa/article/detail/T0437448EN_US/bmw-of-north-america-reports-q3-2023-u-s-sales-results?language=en_US#:~:text=BMW%20delivered%2013%2C079%20battery%20electric,volume%

https://www.audi-mediacenter.com/en/press-releases/audi-group-good-performance-in-the-first-half-of-the-year-despite-major-challenges-15496 (https://www.audi-mediacenter.com/en/press-releases/audi-group-good-performance-in-the-first-half-of-the-year-despite-major-challenges-15496)

https://ir.xiaopeng.com/news-releases/news-release-details/xpeng-announces-vehicle-delivery-results-august-2023 (https://ir.xiaopeng.com/news-releases/news-release-details/xpeng-announces-vehicle-delivery-results-august-2023)

https://group.mercedes-benz.com/investors/reports-news/interim-reports/q3-2023/ (https://group.mercedes-benz.com/investors/reports-news/interim-reports/q3-2023/)

In [7]:
```
sale = pd.read_csv('sale.csv')
sale.shape
```

Out[7]: (15, 10)

cleaning data that from each company website

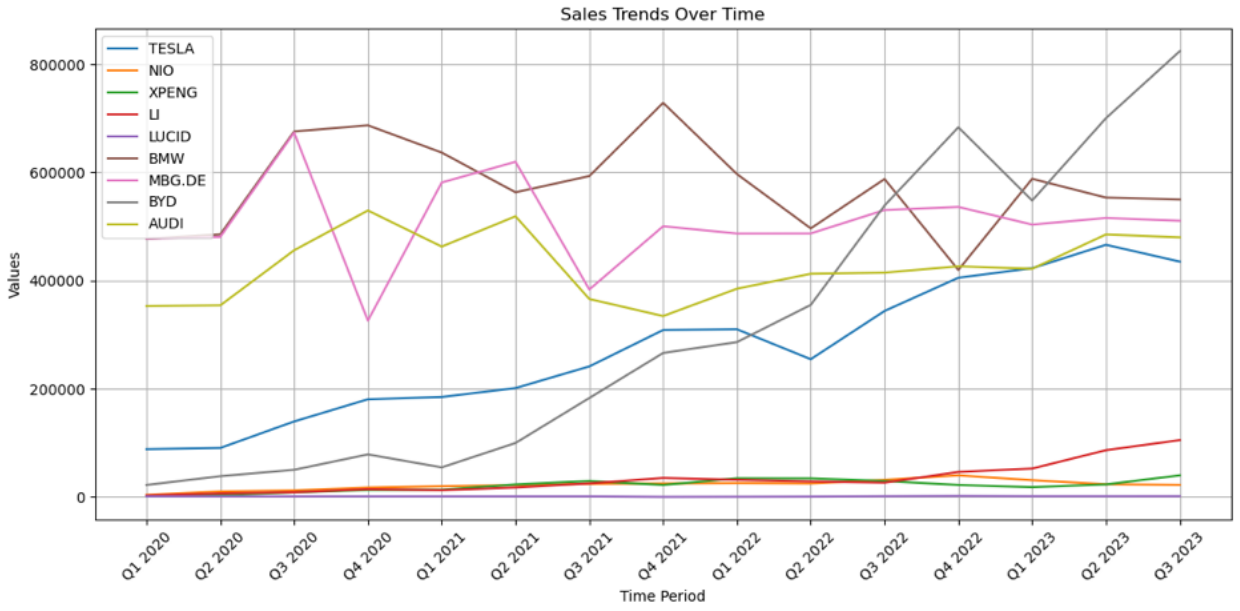
In [8]:
```
numeric_columns_new = ['TESLA', 'NIO', 'XPENG', 'LI', 'LUCID', 'BI
for col in numeric_columns_new:
    if sale[col].dtype == object:
        sale[col] = pd.to_numeric(sale[col].str.replace(',', ''),

sale.fillna(sale.mean(numeric_only=True), inplace=True)
missing_values_after_cleaning = sale.isnull().sum()

data_types_after_cleaning = sale.dtypes

missing_values_after_cleaning, data_types_after_cleaning

#sale.head()
```

Out[8]:
```
(Date      0
 TESLA     0
 NIO       0
 XPENG     0
 LI        0
 LUCID     0
 BMW       0
 MBG.DE    0
 BYD       0
 AUDI      0
 dtype: int64,
 Date       object
 TESLA       int64
 NIO       float64
 XPENG       int64
 LI          int64
 LUCID     float64
 BMW         int64
 MBG.DE      int64
 BYD         int64
 AUDI        int64
 dtype: object)
```

How has the rise of EVs affected the sales and market share of gasoline cars in recent years?

In [9]:

```
sale.fillna(sale.mean(numeric_only=True), inplace=True)

numeric_columns_new = sale.columns[1:]
if sale[col].dtype == 'object':
    sale[col] = pd.to_numeric(sale[col].str.replace(',', ''), err


plt.figure(figsize=(12, 6))
time_periods = sale.iloc[:, 0]

for col in numeric_columns_new:
    plt.plot(time_periods, sale[col], label=col)

plt.xlabel('Time Period')
plt.ylabel('Values')
plt.title('Sales Trends Over Time')
plt.legend()
plt.xticks(rotation=45)
plt.grid(True)
plt.tight_layout()

plt.show()
```



As mentioned in response to question 1, the electric vehicle (EV) industry's growing overall trading volume is a reliable predictor of future growth. This pattern implies that investors are becoming increasingly optimistic about the EV market, which is consistent with projections of rising demand and profits. A gain in this area might be interpreted as encouraging news for the growth of the EV business because trading volumes are frequently correlated with investor interest and market confidence.

The increase in trade volume and the present market trends, which indicate that EV companies are reporting higher sales, suggest that EVs will likely become more common in the future. Technological developments, lower production costs, more consumer knowledge of and desire for sustainable transportation options all contribute to this change. But it's crucial to remember that the automotive sector is complicated and impacted by a number of variables, such as the state of the economy, shifts in regulations, and advances in technology, all of which may have an impact on the rate and kind of this expansion.

conclusion

Based on the data we have collected thus far, it is evident that electric vehicle (EV) companies have indeed had an impact on the gasoline car market. While the gasoline car market has not seen an immediate and significant decline in sales, there are notable trends and factors to consider.

Firstly, it is clear that electric vehicle companies have garnered substantial attention from investors and consumers alike. This increased interest in electric vehicles is indicative of a growing shift in consumer preferences and environmental awareness. The consistent growth in the electric vehicle market and the investments pouring into EV technology suggest that this trend is likely to continue in the foreseeable future.

Although the gasoline car market has not experienced an abrupt downturn, it is important to recognize that the electric vehicle market is still in its early stages of widespread adoption. As EV technology advances and becomes more accessible, we can expect a more pronounced impact on gasoline car sales.

In conclusion, while the gasoline car market has not been severely disrupted as of now, the rise of electric vehicles has undeniably shifted the landscape of the automotive industry. With increasing investor attention and continuous growth in electric vehicle sales, the gasoline car market should be prepared for potential challenges in the coming years as electric vehicles continue to gain traction and influence consumer choices.

In [ ]:
```
1
```