In [27]:

```python
import pandas as pd
import numpy as np
mg=pd.read_csv("major_groups.csv")
pf=pd.read_csv("public_firms.csv")
#mg.head()
#pf.head()

firms= pf[(pf["sic"]>=5800) & (pf["sic"]<=5899)]
```

In [28]:

```python
#Unique no of firm-year are 27
print(len(firms["fyear"].unique()))
```

```
27
```

In [29]:

```python
#Unique no of firms are 252
print(len(firms["conm"].unique()))
```

```
252
```

In [30]:

```python
#DARDEN RESTAURANTS INC = 27
new=firms.groupby("conm")[["fyear"]].nunique()
new[new["fyear"]==27]
```

Out[30]:

	fyear
conm	
DARDEN RESTAURANTS INC	27

In [31]:

```python
firms[firms["fyear"]==2020.0].sort_values("prcc_c", ascending=False)[["conm"
```

Out[31]:

	conm	prcc_c
187903	CHIPOTLE MEXICAN GRILL INC	1386.71
181039	DOMINO'S PIZZA INC	383.46
24624	MCDONALD'S CORP	214.58
80756	WINGSTOP INC	132.55
10228	CRACKER BARREL OLD CTRY STOR	131.92
113017	DARDEN RESTAURANTS INC	119.12
9795	BIGLARI HOLDINGS INC	111.20
141481	YUM BRANDS INC	108.56
88350	STARBUCKS CORP	106.98
50183	JACK IN THE BOX INC	92.80

In [32]:

```python
firms.groupby("conm")[['sale']].sum().sort_values("sale", ascending=False).h
```

Out[32]:

	sale
conm	
MCDONALD'S CORP	517754.100
SODEXO	393959.674
STARBUCKS CORP	270978.501
YUM BRANDS INC	243378.000
DARDEN RESTAURANTS INC	158341.992
ARAMARK CORP	150100.066
ARAMARK	130479.905
BRINKER INTL INC	74836.564
CRACKER BARREL OLD CTRY STOR	58448.876
MITCHELLS & BUTLER PLC	58020.689

In [33]:

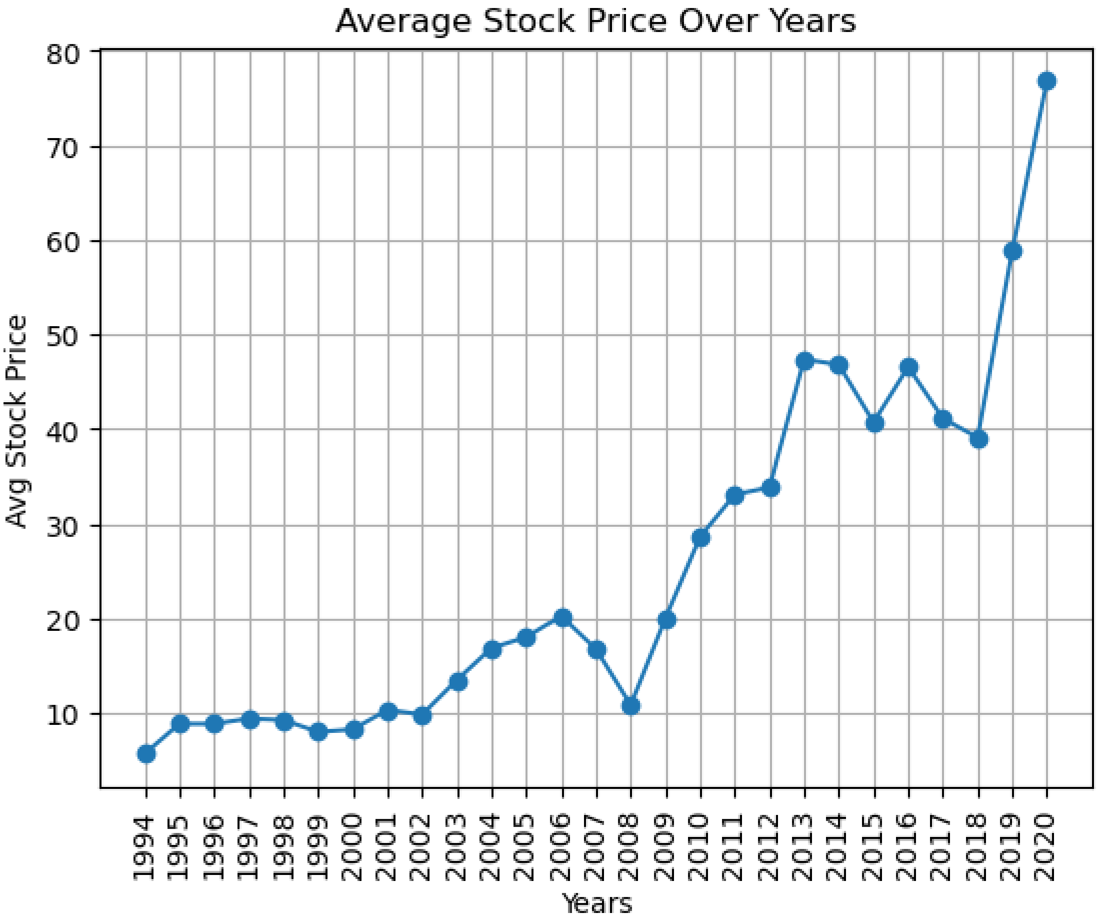
```
firms.groupby("location")[["conm"]].nunique().sort_values("conm",ascending=
```

Out[33]:

	conm
location	
USA	236
CAN	5
CHN	3
BRA	1
FRA	1
GBR	1
HKG	1
JPN	1
NIC	1
TUR	1

In [34]:

```
import matplotlib.pyplot as plt
line_c=firms.groupby("fyear")[["prcc_c"]].mean()
x=line_c.index
y=line_c["prcc_c"]
plt.plot(x,y, marker='o')
plt.xticks(x,rotation=90)
plt.title("Average Stock Price Over Years")
plt.xlabel("Years")
plt.ylabel("Avg Stock Price")
plt.grid()
```



In [35]:

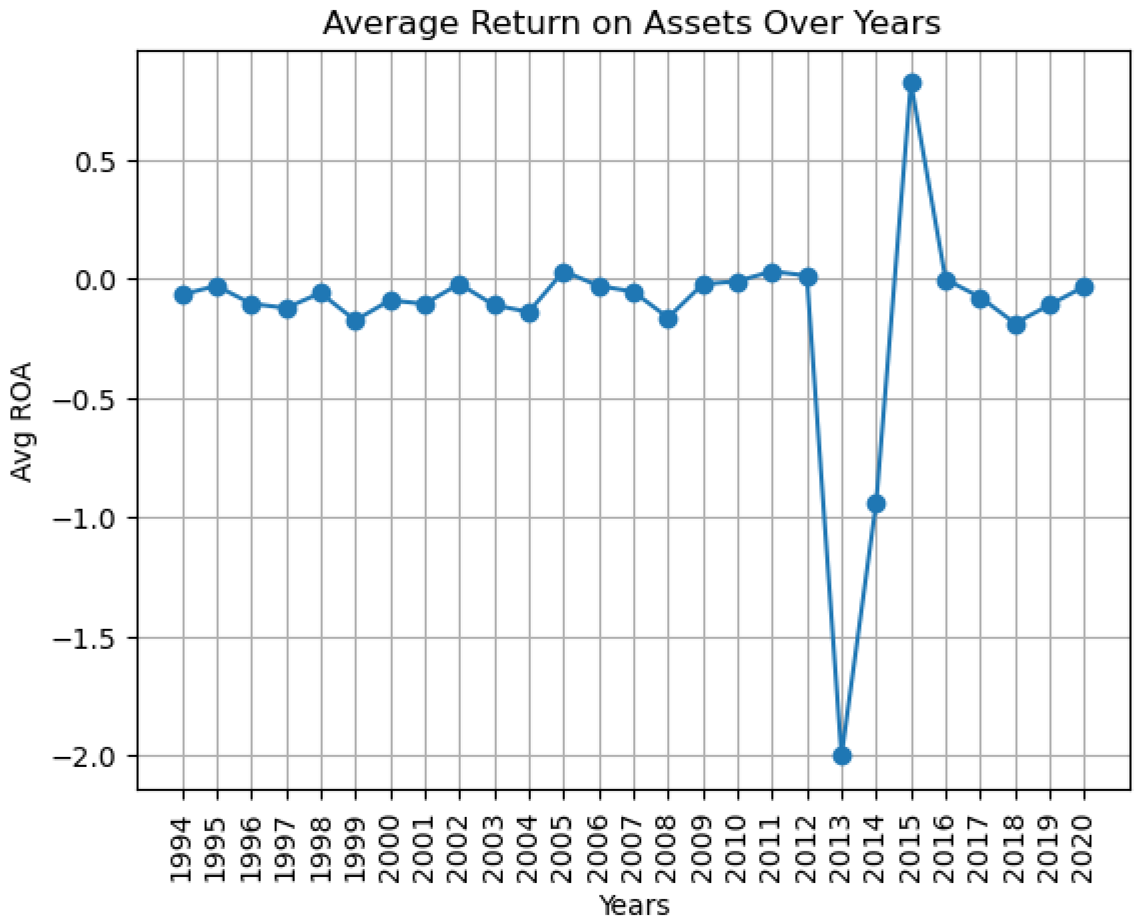
```
firms_07= firms[(firms["fyear"]==2007)][["conm","gvkey","fyear","prcc_c"]]
firms_08= firms[(firms["fyear"]==2008)][["conm","gvkey","fyear","prcc_c"]]
firms_0708= pd.merge(firms_07,firms_08, on="gvkey",suffixes=('_2007', '_2008
firms_0708["percentage_drop"]=(firms_0708["prcc_c_2007"]-firms_0708["prcc_c_
firms_0708.sort_values("percentage_drop", ascending=False)[:1]
```

Out[35]:

	conm_2007	gvkey	fyear_2007	prcc_c_2007	conm_2008	fyear_2008	prcc_c_2008
32	GRILL CONCEPTS INC	29346	2007	4.16	GRILL CONCEPTS INC	2008	0.24

In [36]:

```
USA_firms=firms[firms["location"]=="USA"].groupby("fyear")[["roa"]].mean()
x=USA_firms.index
y=USA_firms["roa"]
plt.plot(x,y, marker='o')
plt.xticks(x,rotation=90)
plt.title("Average Return on Assets Over Years")
plt.xlabel("Years")
plt.ylabel("Avg ROA")
plt.grid()
```



In [37]:

```
import nltk
import string


from nltk.corpus import stopwords
#nltk.download('stopwords')


data2020_10k=pd.read_csv("2020_10K_item1_full.csv")

translator = str.maketrans('', '', string.punctuation)
sw = stopwords.words('english')

def clean_text(text):
    # lower case
    clean_text = text.lower()

    # remove punctuation
    clean_text = clean_text.translate(translator)

    # remove stopwords
    clean_words = [w for w in clean_text.split() if w not in sw]

    return ' '.join(clean_words)

data2020_10k['item_text']=data2020_10k['item_1_text'].apply(clean_text)
```

In [38]:

```
data2020_10k['item_text'].head()
```

Out[38]:

```
0    fixed expenses previosuly documented 8k 235000...
1    general hurco companies inc international indu...
2    engaged business developing marketing products...
3    corporate history chun capital group formerly ...
4    corporate history chun capital group formerly ...
Name: item_text, dtype: object
```

In [39]:

```python
#firms data for 2020 only
firms_2020=firms[firms["fyear"]==2020]
```

In [40]:

```python
firms_10K= pd.merge(firms_2020, data2020_10k, on='gvkey', how='inner', suffi
firms_10K.head()

from collections import Counter

def get_keywords_wc(text):
    c = Counter(text.split())
    words = []
    for pair in c.most_common(10):
        words.append(pair[0])
    return ' '.join(words)

firms_10K['keyword_clean_wc'] = firms_10K['item_text'].apply(get_keywords_wc

firms_10K.head()
```

Out[40]:

	gvkey	fyear	location	conm	ipodate	sic	prcc_c	ch	ni	as
0	3007	2020	USA	BRINKER INTL INC	NaN	5812	56.57	43.900	24.400	2356.
1	3424	2020	USA	BIGLARI HOLDINGS INC	NaN	5812	111.20	24.503	-37.989	1017.
2	3570	2020	USA	CRACKER BARREL OLD CTRY STOR	NaN	5812	131.92	436.996	-32.475	2544.
3	3708	2020	USA	WENDY'S CO	NaN	5812	21.92	306.989	117.832	5040.
4	7154	2020	USA	MCDONALD'S CORP	NaN	5812	214.58	3449.100	4730.500	52626.

In [41]:

```python
from sklearn.feature_extraction.text import TfidfVectorizer

def get_keywords_tfidf(document_list):
    # Step 1: Create the TF-IDF vectorizer
    vectorizer = TfidfVectorizer()

    # Step 2: Calculate the TF-IDF matrix
    tfidf_matrix = vectorizer.fit_transform(document_list)

    # Step 3: Get feature names (words)
    feature_names = vectorizer.get_feature_names_out()

    # Step 4: Extract top 10 keywords for each text
    top_keywords = []
    for i in range(len(document_list)):

        if i %100 == 0:
            print(f'Processing the {i}/{len(document_list)} document.')

        feature_index = tfidf_matrix[i, :].nonzero()[1]
        tfidf_scores = zip(feature_index, [tfidf_matrix[i, x] for x in featu
        sorted_tfidf_scores = sorted(tfidf_scores, key=lambda x: x[1], rever
        top_keywords.append(' '.join([feature_names[i] for i, _ in sorted_tf

    return top_keywords

keywords = get_keywords_tfidf(firms_10K['item_text'].tolist())
firms_10K['keyword_clean_tfidf'] =  keywords
firms_10K.head()
```

```
Processing the 0/46 document.
```

Out[41]:

	gvkey	fyear	location	conm	ipodate	sic	prcc_c	ch	ni	as
0	3007	2020	USA	BRINKER INTL INC	NaN	5812	56.57	43.900	24.400	2356.
1	3424	2020	USA	BIGLARI HOLDINGS INC	NaN	5812	111.20	24.503	-37.989	1017.
2	3570	2020	USA	CRACKER BARREL OLD CTRY STOR	NaN	5812	131.92	436.996	-32.475	2544.
3	3708	2020	USA	WENDY'S CO	NaN	5812	21.92	306.989	117.832	5040.
4	7154	2020	USA	MCDONALD'S CORP	NaN	5812	214.58	3449.100	4730.500	52626.

In [42]:

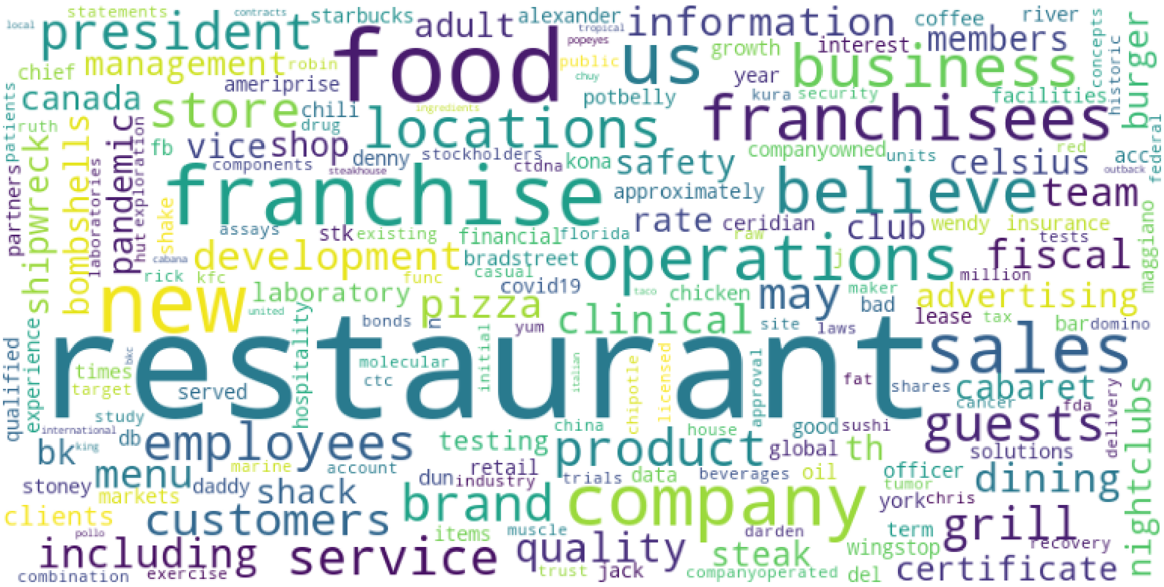
```
#!conda install -c conda-forge wordcloud -y
from wordcloud import WordCloud
import matplotlib.pyplot as plt

text1 = ' '.join(firms_10K['keyword_clean_wc'].tolist())

wordcloud1 = WordCloud(width=800, height=400, background_color='white').gene

plt.figure(figsize=(10,5))
plt.imshow(wordcloud1)
plt.savefig('keyword_wc.png') # save as PNG file
plt.axis('off')

plt.show()
```



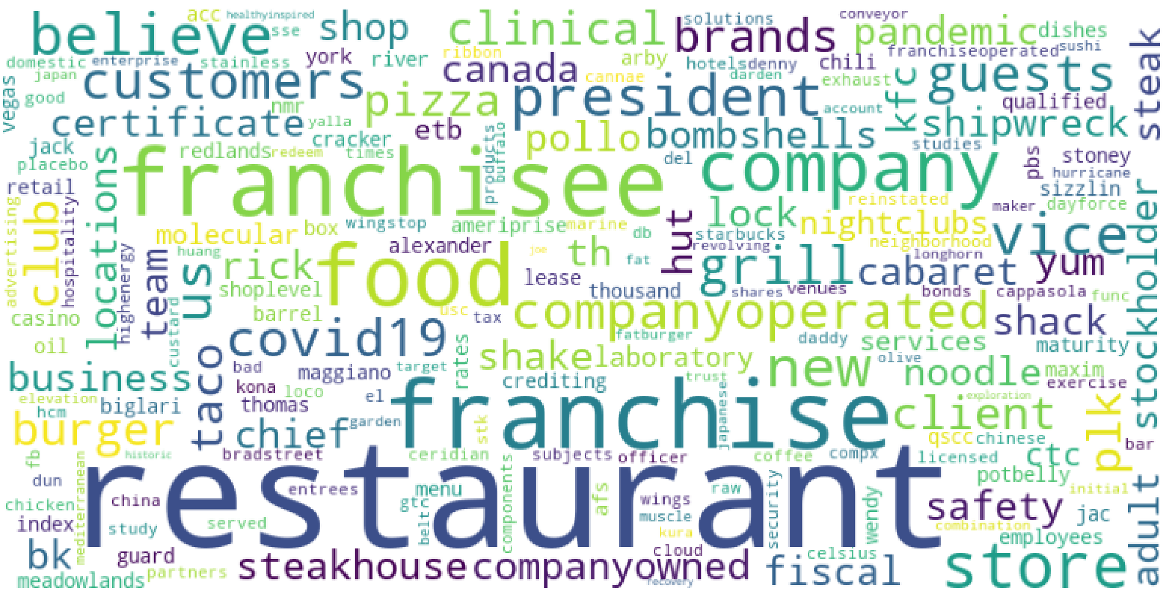
In [43]:

```
text2 = ' '.join(firms_10K['keyword_clean_tfidf'].tolist())

#lower max_font_size
wordcloud2 = WordCloud(width=800, height=400, background_color='white').gene

plt.figure(figsize=(10,5))
plt.imshow(wordcloud2)
plt.savefig('keyword_tfidf.png') # save as PNG file
plt.axis('off')

plt.show()
```



In [44]:
```
#!conda install gensim -y

import pandas as pd
from gensim.models import Word2Vec
sent = [row.split() for row in firms_10K['item_text']]

model = Word2Vec(sent, min_count=1, vector_size=50, workers=3, window=3, sg
model.save("word2vec.model")
model = Word2Vec.load("word2vec.model")
```

In [45]:
```
print(model.wv.most_similar('drivethru')[:5])
print()
print(model.wv.most_similar('grill')[:5])
print()
print(model.wv.most_similar('franchise')[:5])
```

```
[('format', 0.9767647385597229), ('category', 0.9762662649154663), ('kitche
ns', 0.9760705232620239), ('dinein', 0.9752644896507263), ('carryout', 0.97
20006585121155)]

[('italian', 0.9261906147003174), ('stoney', 0.9128882884979248), ('carrabb
a', 0.9066435694694519), ('steakhouse', 0.9021524786949158), ('wine', 0.900
8519053459167)]

[('master', 0.9149573445320129), ('franchisee', 0.9067129492759705), ('agre
ements', 0.893153190612793), ('bargaining', 0.873023271560669), ('fees', 0.
8653981685638428)]
```

In [46]:
```
firms_chipotle=firms[firms["gvkey"]==165914]

plt.figure(figsize=(8, 6))# Adjust the figure size as needed
dark_yellow = "#FFD700"
plt.plot(firms_chipotle["fyear"],firms_chipotle["sale"],label="sale", color=
plt.plot(firms_chipotle["fyear"],firms_chipotle["prcc_c"],label="prcc_c", co
plt.plot(firms_chipotle["fyear"],firms_chipotle["ni"],label="net income", co

# Show data points
year_2016 = 2016
year_2020 = 2020

sales_2016 = firms_chipotle[firms_chipotle["fyear"] == year_2016]["sale"] #s
ni_2016 = firms_chipotle[firms_chipotle["fyear"] == year_2016]["ni"] #net in
```

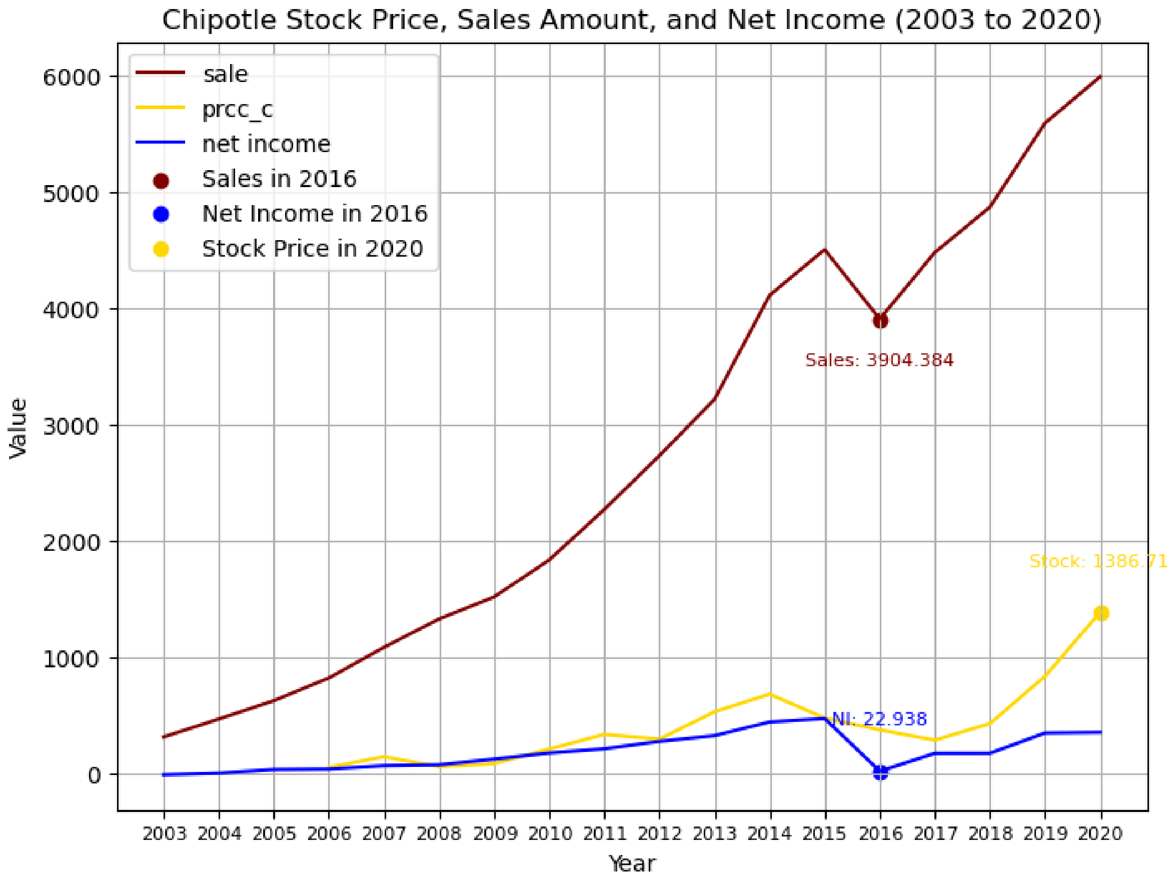
```
stock_2020 = firms_chipotle[firms_chipotle["fyear"] == year_2020]["prcc_c"]

plt.scatter(year_2016, sales_2016, color="maroon", marker="o", label="Sales
plt.scatter(year_2016, ni_2016, color="blue", marker="o", label="Net Income
plt.scatter(year_2020, stock_2020, color= dark_yellow, marker="o", label="St

# Annotate the data point with the sales value
plt.annotate(f"Sales: {sales_2016.values[0]}", (year_2016, sales_2016), text
plt.annotate(f"NI: {ni_2016.values[0]}", (year_2016, ni_2016), textcoords="o
plt.annotate(f"Stock: {stock_2020.values[0]}", (year_2020, stock_2020), text

plt.legend()
plt.xticks(range(2003, 2021), fontsize=8)
plt.xlabel('Year')
plt.ylabel('Value')
plt.title('Chipotle Stock Price, Sales Amount, and Net Income (2003 to 2020)
plt.grid(True)

plt.show()
```



In [47]:

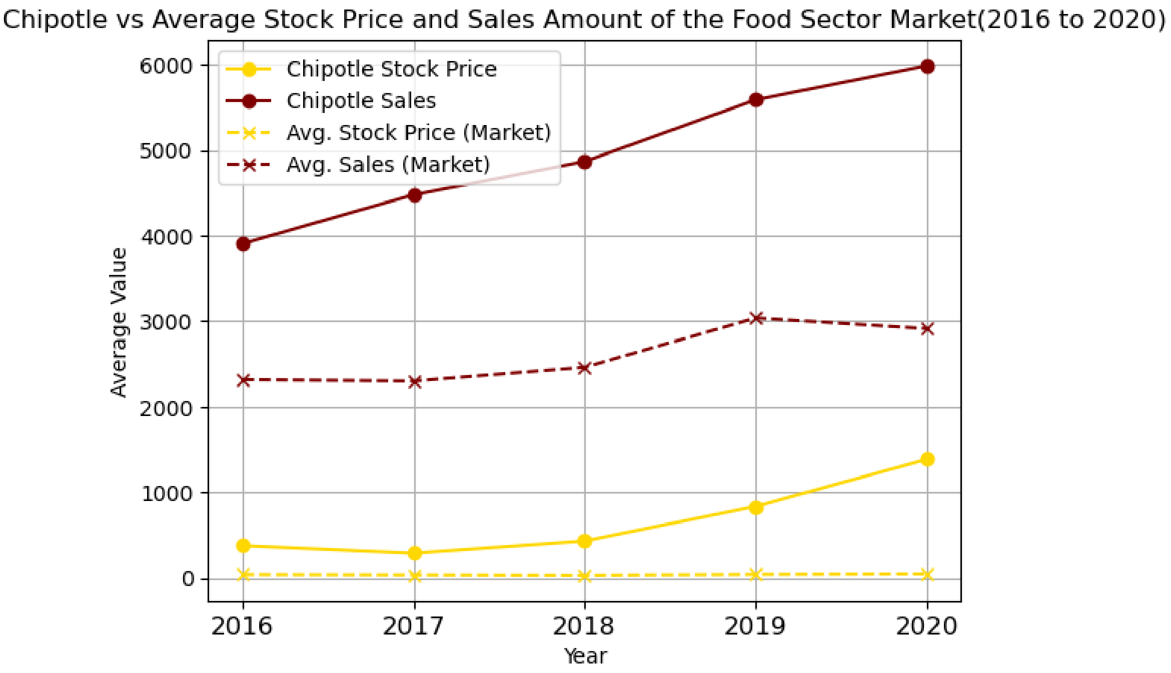
```
#data from 2016 to 2020
food_mkt = firms[(firms["fyear"] >= 2016) & (firms["fyear"] <= 2020)]
#print(food_mkt["gvkey"].nunique()) # total of 79 food companies in the mark

chipotle_16_20 = food_mkt[food_mkt["gvkey"]==165914]
food_mkt_16_20= food_mkt[food_mkt["gvkey"]!=165914]

# Calculate average stock price and sales for the food market from 2016 to 2
avg_sp = food_mkt_16_20.groupby("fyear")["prcc_c"].mean()
avg_sales = food_mkt_16_20.groupby("fyear")["sale"].mean()

# Plot Chipotle's stock price and sales
plt.plot(chipotle_16_20["fyear"], chipotle_16_20["prcc_c"], label="Chipotle
plt.plot(chipotle_16_20["fyear"], chipotle_16_20["sale"], label="Chipotle Sa
# Plot the average stock price and sales of the food market
plt.plot(avg_sp.index, avg_sp.values, label="Avg. Stock Price (Market)", lin
plt.plot(avg_sales.index, avg_sales.values, label="Avg. Sales (Market)", lin

plt.legend()
plt.xticks(range(2016, 2021), fontsize=12)
plt.xlabel('Year')
plt.ylabel('Average Value')
plt.title('Chipotle vs Average Stock Price and Sales Amount of the Food Sect
plt.grid(True)
plt.show()
```



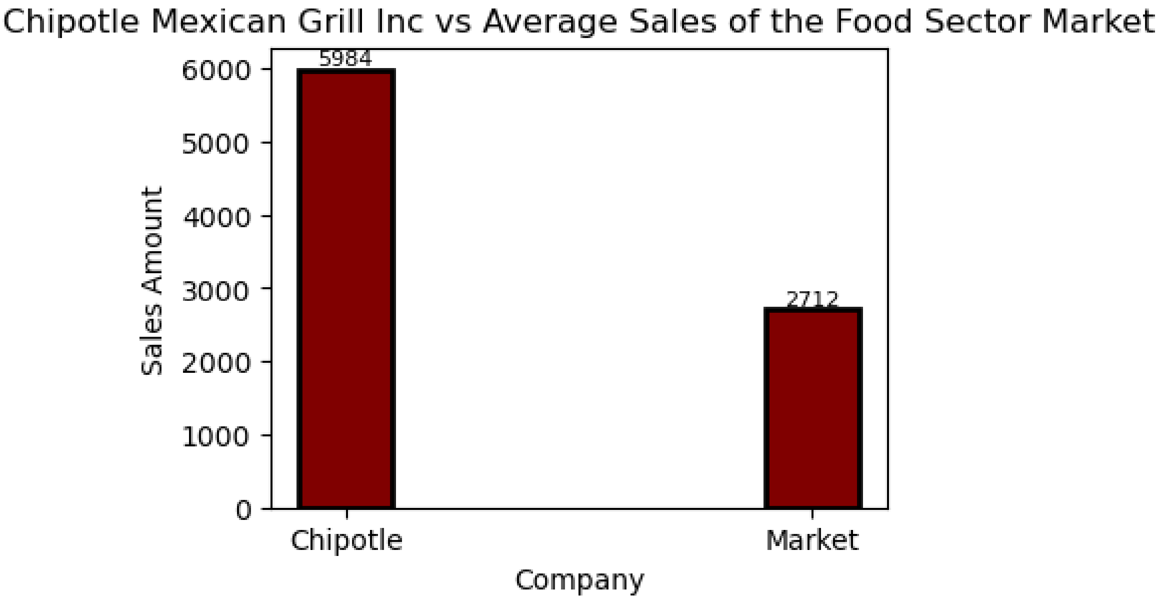
In [48]:

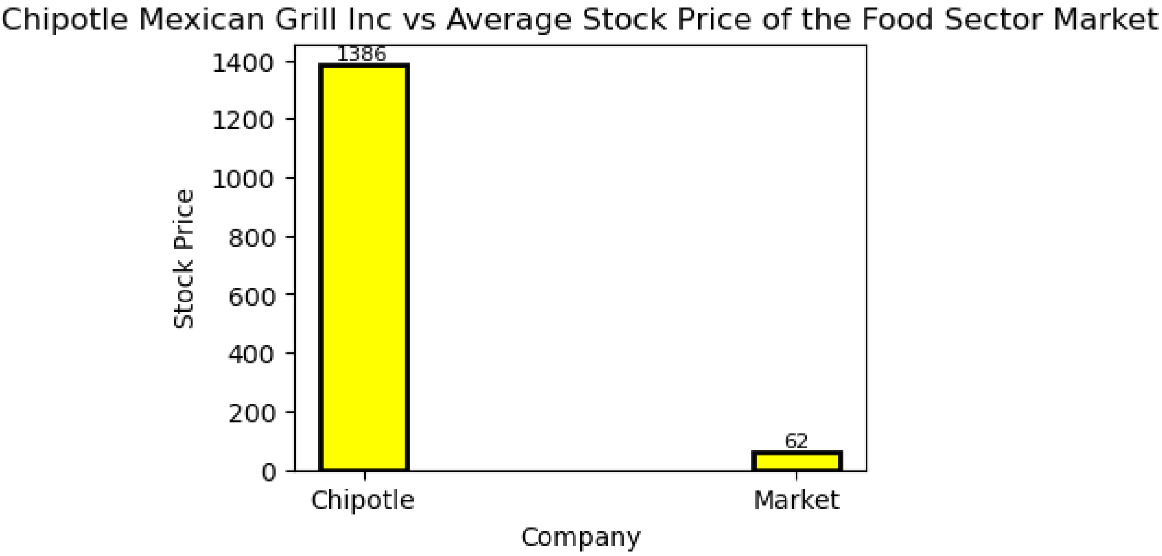
```
firm_focal=firms_10K[firms_10K["gvkey"]==165914]
firm_market=firms_10K[firms_10K["gvkey"]!=165914]
print(len(firm_market)) #compared with other 45 companies in the food market

# bar chart for sales amount
ff_x=int(firm_focal["sale"])
fm_x=int(firm_market["sale"].mean())
sale_key=np.array(["Chipotle","Market"])
sale_arr=np.array([ff_x,fm_x])
plt.figure(figsize=(4, 3))# Adjust the figure size as needed
plt.bar(sale_key, sale_arr,width = 0.2,color='maroon', edgecolor='black', li
plt.xlabel('Company')
plt.ylabel('Sales Amount')
plt.title('Chipotle Mexican Grill Inc vs Average Sales of the Food Sector Ma
for i in range(len(sale_key)):
    plt.text(sale_key[i], sale_arr[i], sale_arr[i], ha='center', va='bottom'

# bar chart for stock price
ff_y=int(firm_focal["prcc_c"])
fm_y=int(firm_market["prcc_c"].mean())
sale_key=np.array(["Chipotle","Market"])
sale_arr=np.array([ff_y,fm_y])
plt.figure(figsize=(4, 3))# Adjust the figure size as needed
plt.bar(sale_key, sale_arr,width = 0.2,color='yellow', edgecolor='black', li
plt.xlabel('Company')
plt.ylabel('Stock Price')
plt.title('Chipotle Mexican Grill Inc vs Average Stock Price of the Food Sec
for i in range(len(sale_key)):
    plt.text(sale_key[i], sale_arr[i], sale_arr[i], ha='center', va='bottom'
plt.show()
```

```
45
```





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In [ ]:
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In [ ]:
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