Introduction

This research aims to explore the relationship between economic growth and Olympic success by examining the trends in GDP share and medal counts for the United States and China over several decades. By analyzing data on GDP share of the world, proportion of total medals and proportion of gold medals, we seek to understand how economic power influences a nation's performance in the Olympics. This study leverages historical data and correlation analysis to draw connections between economic resources and athletic achievements, providing insights into how countries can leverage their economic strength to enhance their global sporting presence. The findings highlight the significant impact of economic growth on a nation's ability to excel in international competitions, particularly in the context of the Olympics. Source of Olympic Data: https://www.kaggle.com/code/hamdallak/125-years-of-summer-olympics-analysis-visual/notebook Source of GDP Data: https://fred.stlouisfed.org/series/GDP#0

In [1]:

```
import os
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import datetime

%matplotlib inline
```

In [2]:

```
medals = pd.read_csv(r"C:\Users\lasra\Desktop\olympics\Country_Medals.csv", encoding= 'unicode_escape')
```

In [3]:

```
medals.head()
```

Out[3]:

	Year;Country_Code;Country_Name;Host_city;Host_country;Gold;Silver;Bronze
0	1932;(USA);United States;Los Angeles;United St...
1	1932;(ITA);Italy;Los Angeles;United States;12;...
2	1932;(FRA);France;Los Angeles;United States;10...
3	1932;(SWE);Sweden;Los Angeles;United States;9;5;9
4	1932;(JPN);Japan;Los Angeles;United States;7;7;4

In [4]:

```
medals = medals.rename(columns = {'Year;Country_Code;Country_Name;Host_city;Host_country;Gold;Silver;Bronze': 'all_data
```

In [5]:

```
medals.head()
```

Out[5]:

	all_data
0	1932;(USA);United States;Los Angeles;United St...
1	1932;(ITA);Italy;Los Angeles;United States;12;...
2	1932;(FRA);France;Los Angeles;United States;10...
3	1932;(SWE);Sweden;Los Angeles;United States;9;5;9
4	1932;(JPN);Japan;Los Angeles;United States;7;7;4

In [6]:

```
'Year;Country_Code;Country_Name;Host_city;Host_country;Gold;Silver;Bronze'.split(';')
```

Out[6]:

```
['Year',
 'Country_Code',
 'Country_Name',
 'Host_city',
 'Host_country',
 'Gold',
 'Silver',
 'Bronze']
```

In [7]:

```
'Year;Country_Code;Country_Name;Host_city;Host_country;Gold;Silver;Bronze'.split(';')[0]
```

Out[7]:

```
'Year'
```

In [8]:

```
def year(x):
    return x.split(';')[0]

def Country_Code(x):
    return x.split(';')[1]

def Country_Name(x):
    return x.split(';')[2]

def Host_city(x):
    return x.split(';')[3]

def Host_country(x):
    return x.split(';')[4]

def Gold(x):
    return x.split(';')[5]
```

```python
def Silver(x):
    return x.split(';')[6]

def Bronze(x):
    return x.split(';')[7]
```

In [9]:

```python
medals['year']=medals['all_data'].apply(year)
medals['Country_Code']=medals['all_data'].apply(Country_Code)
medals['Country_Name']=medals['all_data'].apply(Country_Name)
medals['Host_city']=medals['all_data'].apply(Host_city)
medals['Host_country']=medals['all_data'].apply(Host_country)
medals['Gold']=medals['all_data'].apply(Gold)
medals['Silver']=medals['all_data'].apply(Silver)
medals['Bronze']=medals['all_data'].apply(Bronze)
```

In [10]:

```python
medals.head()
```

Out[10]:

	all_data	year	Country_Code	Country_Name	Host_city	Host_country	Gold	Silver	Bronze
0	1932;(USA);United States;Los Angeles;United St...	1932	(USA)	United States	Los Angeles	United States	41	32	30
1	1932;(ITA);Italy;Los Angeles;United States;12;...	1932	(ITA)	Italy	Los Angeles	United States	12	12	12
2	1932;(FRA);France;Los Angeles;United States;10...	1932	(FRA)	France	Los Angeles	United States	10	5	4
3	1932;(SWE);Sweden;Los Angeles;United States;9;5;9	1932	(SWE)	Sweden	Los Angeles	United States	9	5	9
4	1932;(JPN);Japan;Los Angeles;United States;7;7;4	1932	(JPN)	Japan	Los Angeles	United States	7	7	4

In [11]:

```python
medals=medals.drop(['all_data'],axis=1)
```

In [12]:

```python
medals
```

Out[12]:

	year	Country_Code	Country_Name	Host_city	Host_country	Gold	Silver	Bronze
0	1932	(USA)	United States	Los Angeles	United States	41	32	30
1	1932	(ITA)	Italy	Los Angeles	United States	12	12	12
2	1932	(FRA)	France	Los Angeles	United States	10	5	4
3	1932	(SWE)	Sweden	Los Angeles	United States	9	5	9
4	1932	(JPN)	Japan	Los Angeles	United States	7	7	4
...	...	...	...	...	...	...	...	...
1339	1936	(MEX)	Mexico	Berlin	Germany	0	0	3
1340	1936	(BEL)	Belgium	Berlin	Germany	0	0	2
1341	1936	(AUS)	Australia	Berlin	Germany	0	0	1
1342	1936	(PHI)	Philippines	Berlin	Germany	0	0	1
1343	1936	(POR)	Portugal	Berlin	Germany	0	0	1

1344 rows × 8 columns

In [13]:

```
medals.shape
```

Out[13]:

```
(1344, 8)
```

In [14]:

```
medals.dtypes
```

Out[14]:

```
year            object
Country_Code    object
Country_Name    object
Host_city       object
Host_country    object
Gold            object
Silver          object
Bronze          object
dtype: object
```

In [15]:

```
medals['Gold']=medals['Gold'].astype(int)
medals['Silver']=medals['Silver'].astype(int)
medals['Bronze']=medals['Bronze'].astype(int)
```

```
medals['year']=medals['year'].astype(int)
medals['Total']=medals['Gold']+medals['Silver']+medals['Bronze']
```

In [16]:

```
medals.dtypes
```

Out[16]:

```
year             int32
Country_Code    object
Country_Name    object
Host_city       object
Host_country    object
Gold             int32
Silver           int32
Bronze           int32
Total            int32
dtype: object
```

In [17]:

```
medals['Country_Name'].unique()
```

Out[17]:

```
array(['United States', 'Italy', 'France', 'Sweden', 'Japan', 'Hungary',
       'Finland', 'Great Britain', 'Germany', 'Australia', 'Argentina',
       'Canada', 'Netherlands', 'Poland', 'South Africa', 'Ireland',
       'Czechoslovakia', 'Austria', 'India', 'Denmark', 'Mexico',
       'Latvia', 'New Zealand', 'Switzerland', 'Philippines', 'Spain',
       'Uruguay', 'Estonia', 'Egypt', 'Norway', 'Yugoslavia', 'Belgium',
       'Chile', 'Haiti', 'Portugal', 'Romania', 'Brazil', 'Greece',
       'Luxembourg', 'Australasia', 'Russian Empire', 'Bohemia', 'Cuba',
       'Mixed team', 'West Germany', 'China', 'South Korea', 'Morocco',
       'Kenya', 'Pakistan', 'Jamaica', 'Nigeria', 'Puerto Rico',
       'Colombia', 'Ivory Coast', 'Peru', 'Syria', 'Thailand', 'Turkey',
       'Venezuela', 'Algeria', 'Cameroon', 'Chinese Taipei',
       'Dominican Republic', 'Iceland', 'Zambia', 'Soviet Union',
       'East Germany', 'Bulgaria', 'Ethiopia', 'Zimbabwe', 'North Korea',
       'Mongolia', 'Tanzania', 'Uganda', 'Guyana', 'Lebanon',
       'Trinidad and Tobago', 'Iran', 'Bermuda', 'Tunisia', 'Ghana',
       'Niger', 'Republic of China', 'United Team of Germany', 'Bahamas',
       'Singapore', 'British West Indies', 'Iraq', 'ROC',
       'Czech Republic', 'Croatia', 'Serbia', 'Slovenia', 'Uzbekistan',
       'Georgia', 'Ecuador', 'Israel', 'Qatar', 'Kosovo', 'Ukraine',
       'Belarus', 'Hong Kong', 'Slovakia', 'Indonesia', 'Fiji',
       'Azerbaijan', 'Armenia', 'Kyrgyzstan', 'San Marino', 'Jordan',
       'Malaysia', 'Bahrain', 'Lithuania', 'Namibia', 'North Macedonia',
       'Saudi Arabia', 'Turkmenistan', 'Kazakhstan', 'Botswana',
       'Burkina Faso', 'Grenada', 'Kuwait', 'Moldova', 'Russia',
       'Vietnam', 'Independent Olympic Athletes', 'Tajikistan', 'Burundi',
       'United Arab Emirates', 'Cyprus', 'Gabon', 'Guatemala',
       'Montenegro', 'Afghanistan', 'Panama', 'Samoa', 'Sudan',
       'Mauritius', 'Togo', 'Serbia and Montenegro', 'Paraguay',
       'Eritrea', 'Mozambique', 'Sri Lanka', 'Costa Rica', 'Barbados',
       'Macedonia', 'Tonga', 'Unified Team',
       'Independent Olympic Participants', 'Suriname',
       'Netherlands Antilles', 'Senegal', 'Virgin Islands', 'Djibouti',
       'Ceylon'], dtype=object)
```

In [18]:

```
medals['Country_Name'] = medals['Country_Name'].replace('Republic of China', 'China')
```

In [19]:

```
medals['Country_Name'].unique()
```

Out[19]:

```
array(['United States', 'Italy', 'France', 'Sweden', 'Japan', 'Hungary',
       'Finland', 'Great Britain', 'Germany', 'Australia', 'Argentina',
       'Canada', 'Netherlands', 'Poland', 'South Africa', 'Ireland',
       'Czechoslovakia', 'Austria', 'India', 'Denmark', 'Mexico',
       'Latvia', 'New Zealand', 'Switzerland', 'Philippines', 'Spain',
       'Uruguay', 'Estonia', 'Egypt', 'Norway', 'Yugoslavia', 'Belgium',
       'Chile', 'Haiti', 'Portugal', 'Romania', 'Brazil', 'Greece',
       'Luxembourg', 'Australasia', 'Russian Empire', 'Bohemia', 'Cuba',
       'Mixed team', 'West Germany', 'China', 'South Korea', 'Morocco',
       'Kenya', 'Pakistan', 'Jamaica', 'Nigeria', 'Puerto Rico',
       'Colombia', 'Ivory Coast', 'Peru', 'Syria', 'Thailand', 'Turkey',
       'Venezuela', 'Algeria', 'Cameroon', 'Chinese Taipei',
       'Dominican Republic', 'Iceland', 'Zambia', 'Soviet Union',
       'East Germany', 'Bulgaria', 'Ethiopia', 'Zimbabwe', 'North Korea',
       'Mongolia', 'Tanzania', 'Uganda', 'Guyana', 'Lebanon',
       'Trinidad and Tobago', 'Iran', 'Bermuda', 'Tunisia', 'Ghana',
       'Niger', 'United Team of Germany', 'Bahamas', 'Singapore',
       'British West Indies', 'Iraq', 'ROC', 'Czech Republic', 'Croatia',
       'Serbia', 'Slovenia', 'Uzbekistan', 'Georgia', 'Ecuador', 'Israel',
       'Qatar', 'Kosovo', 'Ukraine', 'Belarus', 'Hong Kong', 'Slovakia',
       'Indonesia', 'Fiji', 'Azerbaijan', 'Armenia', 'Kyrgyzstan',
       'San Marino', 'Jordan', 'Malaysia', 'Bahrain', 'Lithuania',
       'Namibia', 'North Macedonia', 'Saudi Arabia', 'Turkmenistan',
       'Kazakhstan', 'Botswana', 'Burkina Faso', 'Grenada', 'Kuwait',
       'Moldova', 'Russia', 'Vietnam', 'Independent Olympic Athletes',
       'Tajikistan', 'Burundi', 'United Arab Emirates', 'Cyprus', 'Gabon',
       'Guatemala', 'Montenegro', 'Afghanistan', 'Panama', 'Samoa',
       'Sudan', 'Mauritius', 'Togo', 'Serbia and Montenegro', 'Paraguay',
       'Eritrea', 'Mozambique', 'Sri Lanka', 'Costa Rica', 'Barbados',
       'Macedonia', 'Tonga', 'Unified Team',
       'Independent Olympic Participants', 'Suriname',
       'Netherlands Antilles', 'Senegal', 'Virgin Islands', 'Djibouti',
       'Ceylon'], dtype=object)
```

In [20]:

```
medals.head(2)
```

Out[20]:

	year	Country_Code	Country_Name	Host_city	Host_country	Gold	Silver	Bronze	Total
0	1932	(USA)	United States	Los Angeles	United States	41	32	30	103
1	1932	(ITA)	Italy	Los Angeles	United States	12	12	12	36

In [21]:

```
# Step 2: Group by 'year' and sum the 'Total' column
total_medals_per_year = medals.groupby('year')['Total'].sum().reset_index()
```

```
# Rename the 'Total' column to 'Total_Medals' for clarity
total_medals_per_year.rename(columns={'Total': 'Total_Medals_Year'}, inplace=True)

print (total_medals_per_year)
```

```
    year  Total_Medals_Year
0   1896                122
1   1900                284
2   1904                280
3   1908                324
4   1912                317
5   1920                445
6   1924                378
7   1928                327
8   1932                346
9   1936                388
10  1948                411
11  1952                459
12  1956                469
13  1960                461
14  1964                504
15  1968                527
16  1972                600
17  1976                613
18  1980                631
19  1984                688
20  1988                739
21  1992                815
22  1996                842
23  2000                927
24  2004                927
25  2008                958
26  2012                960
27  2016                973
28  2020               1080
```

In [22]:

```
# Step 1: Group by 'year' and sum the 'Gold' column
total_gold_medals_per_year = medals.groupby('year')['Gold'].sum().reset_index()

# Rename the 'Gold' column to 'Total_Gold_Medals' for clarity
total_gold_medals_per_year.rename(columns={'Gold': 'Total_Gold_Year'}, inplace=True)

print(total_gold_medals_per_year)
```

```
    year  Total_Gold_Year
0   1896               43
1   1900               96
2   1904               97
3   1908              110
4   1912              108
5   1920              157
6   1924              126
7   1928              110
8   1932              116
9   1936              130
10  1948              138
11  1952              149
12  1956              153
13  1960              152
14  1964              163
15  1968              174
16  1972              195
17  1976              198
18  1980              204
19  1984              226
20  1988              241
21  1992              260
22  1996              271
23  2000              300
24  2004              301
25  2008              302
26  2012              302
27  2016              307
28  2020              340
```

In [23]:

```
# Step 3: Merge the total gold medals per year with medals2
medals = medals.merge(total_gold_medals_per_year, on='year', how='left')

# Step 4: Merge the total medals per year with medals2
medals = medals.merge(total_medals_per_year, on='year', how='left')
```

In [24]:

```
# Display the resulting DataFrame
medals.sort_values('year')
```

Out[24]:

	year	Country_Code	Country_Name	Host_city	Host_country	Gold	Silver	Bronze	Total	Total_Gold_Year	Total_Medals_Year
182	1896	(GRE)	Greece	Athens	Greece	10	18	19	47	43	122
191	1896	(ZZX)	Mixed team	Athens	Greece	1	0	1	2	43	122
190	1896	(SUI)	Switzerland	Athens	Greece	1	2	0	3	43	122
189	1896	(DEN)	Denmark	Athens	Greece	1	2	3	6	43	122
188	1896	(AUS)	Australia	Athens	Greece	2	0	0	2	43	122
...	...	...	...	...	...	...	...	...	...	...	...
558	2020	(COL)	Colombia	Tokyo	Japan	0	4	1	5	340	1080
560	2020	(DOM)	Dominican Republic	Tokyo	Japan	0	3	2	5	340	1080
561	2020	(ARM)	Armenia	Tokyo	Japan	0	2	2	4	340	1080
551	2020	(EST)	Estonia	Tokyo	Japan	1	0	1	2	340	1080
559	2020	(AZE)	Azerbaijan	Tokyo	Japan	0	3	4	7	340	1080

1344 rows × 11 columns

In [25]:

```
medals2 = medals[(medals['Country_Name'] == 'United States') |
                 (medals['Country_Name'] == 'China') |
                 (medals['Country_Name'] == 'Great Britain')|
                 (medals['Country_Name'] == 'Japan')|
                 (medals['Country_Name'] == 'France')].drop(['Country_Code', 'Host_city', 'Host_country', 'Silver', 'Br
```

In [26]:

```
medals2
```

Out[26]:

	year	Country_Name	Gold	Total	Total_Gold_Year	Total_Medals_Year
185	1896	Great Britain	2	7	43	122
184	1896	France	5	11	43	122
181	1896	United States	11	20	43	122
161	1900	United States	19	48	96	284
162	1900	Great Britain	15	32	96	284
...	...	...	...	...	...	...
500	2020	France	10	33	340	1080
496	2020	Great Britain	22	65	340	1080
495	2020	Japan	27	58	340	1080
494	2020	China	38	88	340	1080
493	2020	United States	39	113	340	1080

120 rows × 6 columns

In [27]:

```
medals2['Gold/Total_Gold_Year']=round(medals2['Gold']/medals2['Total_Gold_Year'],2)
medals2['Total/Total_Medals_Year']= round(medals2['Total']/medals2['Total_Medals_Year'],2)
```

In [28]:

```
medals2
```

Out[28]:

	year	Country_Name	Gold	Total	Total_Gold_Year	Total_Medals_Year	Gold/Total_Gold_Year	Total/Total_Medals_Year
185	1896	Great Britain	2	7	43	122	0.05	0.06
184	1896	France	5	11	43	122	0.12	0.09
181	1896	United States	11	20	43	122	0.26	0.16
161	1900	United States	19	48	96	284	0.20	0.17
162	1900	Great Britain	15	32	96	284	0.16	0.11
...	...	...	...	...	...	...	...	...
500	2020	France	10	33	340	1080	0.03	0.03
496	2020	Great Britain	22	65	340	1080	0.06	0.06
495	2020	Japan	27	58	340	1080	0.08	0.05
494	2020	China	38	88	340	1080	0.11	0.08
493	2020	United States	39	113	340	1080	0.11	0.10

120 rows × 8 columns

When China Got the First Medal

In [29]:

```
medals[medals['Country_Name']=='China'].sort_values('year')
```

Out[29]:

	year	Country_Code	Country_Name	Host_city	Host_country	Gold	Silver	Bronze	Total	Total_Gold_Year	Total_Medals_Year
485	1960	(ROC)	China	Rome	Italy	0	1	0	1	152	461
407	1968	(ROC)	China	Mexico City	Mexico	0	0	1	1	174	527
195	1984	(CHN)	China	Los Angeles	United States	15	8	9	32	226	688
1152	1988	(CHN)	China	Seoul	South Korea	5	11	12	28	241	739
1081	1992	(CHN)	China	Barcelona	Spain	16	22	16	54	260	815
1002	1996	(CHN)	China	Atlanta	United States	16	22	12	50	271	842
921	2000	(CHN)	China	Sydney	Australia	28	16	14	58	300	927
846	2004	(CHN)	China	Athens	Greece	32	17	14	63	301	927
758	2008	(CHN)	China	Beijing	China	48	22	30	100	302	958
673	2012	(CHN)	China	London	Great Britain	38	31	22	91	302	960
588	2016		China	Rio de Janeiro	Brazil	26	18	26	70	307	973
494	2020	(CHN)	China	Tokyo	Japan	38	32	18	88	340	1080

In [30]:

```
medals3= medals2[medals2['year'] >= 1960]
```

In [31]:

```
medals3
```

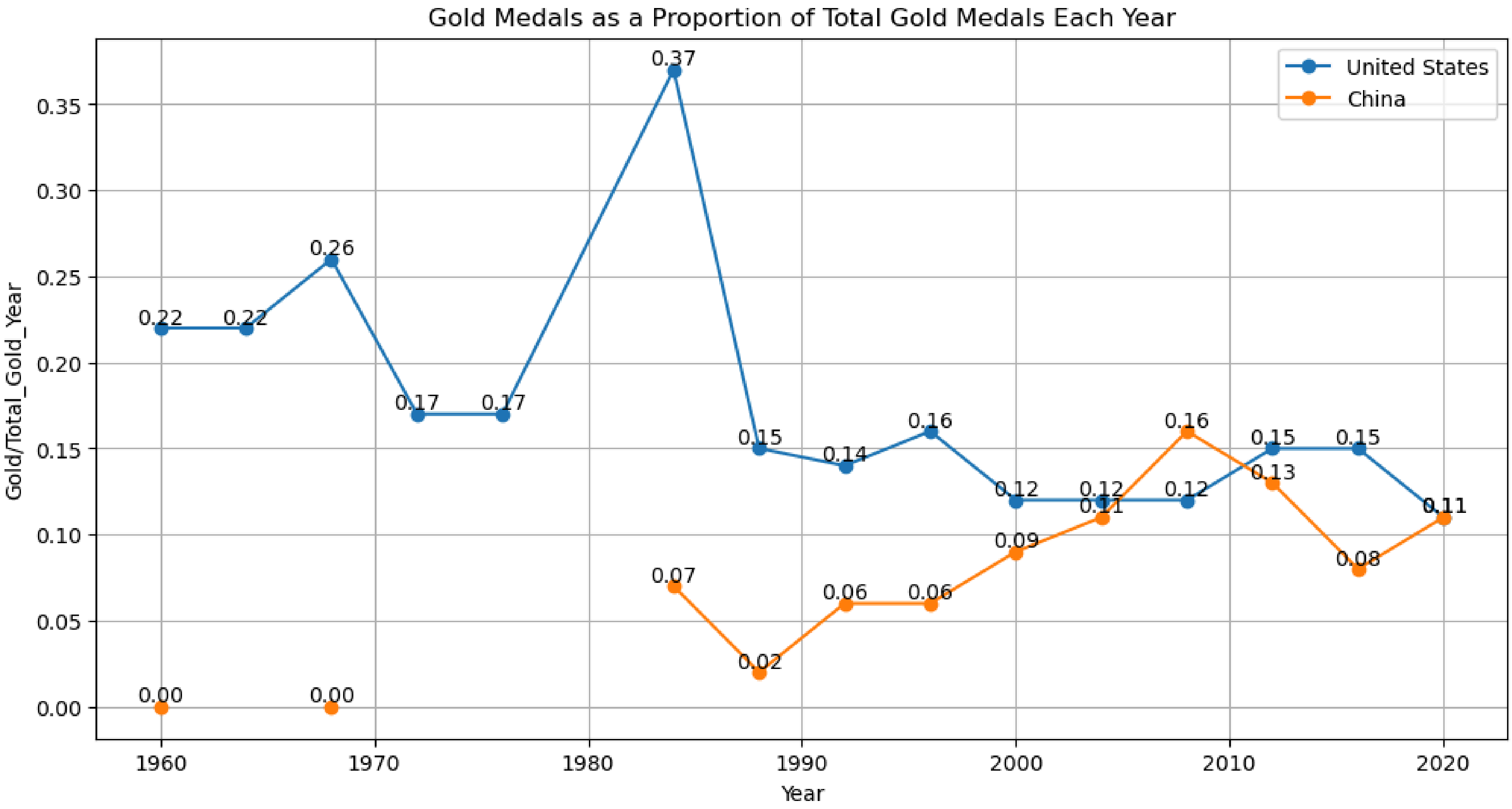
Out[31]:

	year	Country_Name	Gold	Total	Total_Gold_Year	Total_Medals_Year	Gold/Total_Gold_Year	Total/Total_Medals_Year
473	1960	France	0	5	152	461	0.00	0.01
460	1960	Great Britain	2	20	152	461	0.01	0.04
456	1960	Japan	4	18	152	461	0.03	0.04
450	1960	United States	34	71	152	461	0.22	0.15
485	1960	China	0	1	152	461	0.00	0.00
...	...	...	...	...	...	...	...	...
500	2020	France	10	33	340	1080	0.03	0.03
496	2020	Great Britain	22	65	340	1080	0.06	0.06
495	2020	Japan	27	58	340	1080	0.08	0.05
494	2020	China	38	88	340	1080	0.11	0.08
493	2020	United States	39	113	340	1080	0.11	0.10

74 rows × 8 columns

In [32]:

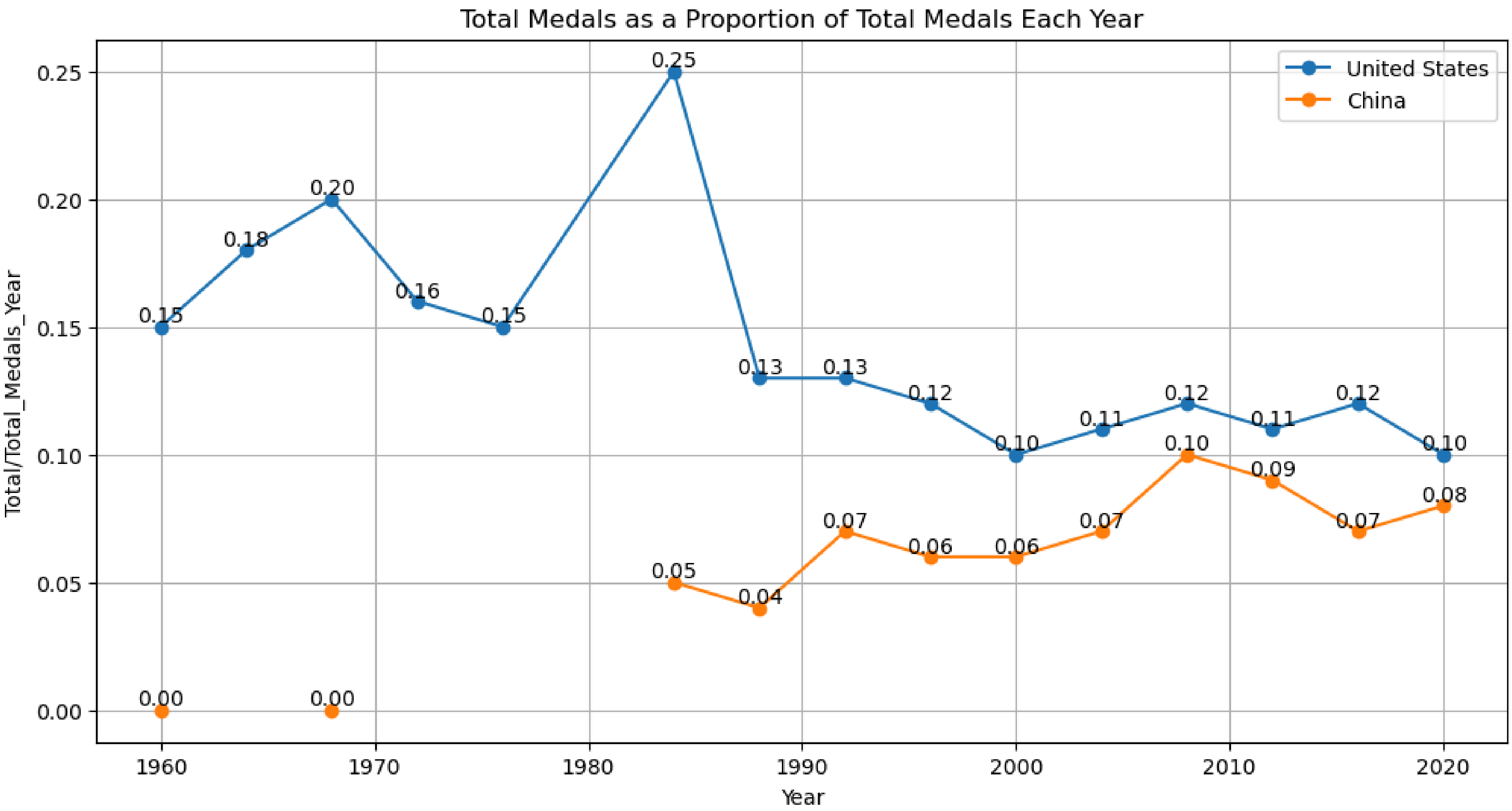
```python
# Filter the data for China and the United States
filtered_data = medals3[(medals3['Country_Name'] == 'China') | (medals3['Country_Name'] == 'United States')]
# Pivot the data to have years as the index and countries as columns for the 'Gold/Total_Gold_Year' ratio
pivot_data = filtered_data.pivot(index='year', columns='Country_Name', values='Gold/Total_Gold_Year')

# Plot the data
plt.figure(figsize=(12, 6))
plt.plot(pivot_data.index, pivot_data['United States'], label='United States', marker='o')
plt.plot(pivot_data.index, pivot_data['China'], label='China', marker='o')

# Add titles and labels
plt.title('Gold Medals as a Proportion of Total Gold Medals Each Year')
plt.xlabel('Year')
plt.ylabel('Gold/Total_Gold_Year')
plt.legend()

# Annotate each point with its y-value
for year in pivot_data.index:
    if not pd.isna(pivot_data['China'][year]):
        plt.text(year, pivot_data['China'][year], f'{pivot_data["China"][year]:.2f}', ha='center', va='bottom')
    if not pd.isna(pivot_data['United States'][year]):
        plt.text(year, pivot_data['United States'][year], f'{pivot_data["United States"][year]:.2f}', ha='center', va='

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



In [33]:

```
# Filter the data for China and the United States
filtered_data = medals3[(medals3['Country_Name'] == 'China') | (medals3['Country_Name'] == 'United States')]
# Pivot the data to have years as the index and countries as columns for the 'Gold/Total_Gold_Year' ratio
pivot_data = filtered_data.pivot(index='year', columns='Country_Name', values='Total/Total_Medals_Year')

# Plot the data
plt.figure(figsize=(12, 6))
plt.plot(pivot_data.index, pivot_data['United States'], label='United States', marker='o')
plt.plot(pivot_data.index, pivot_data['China'], label='China', marker='o')
```

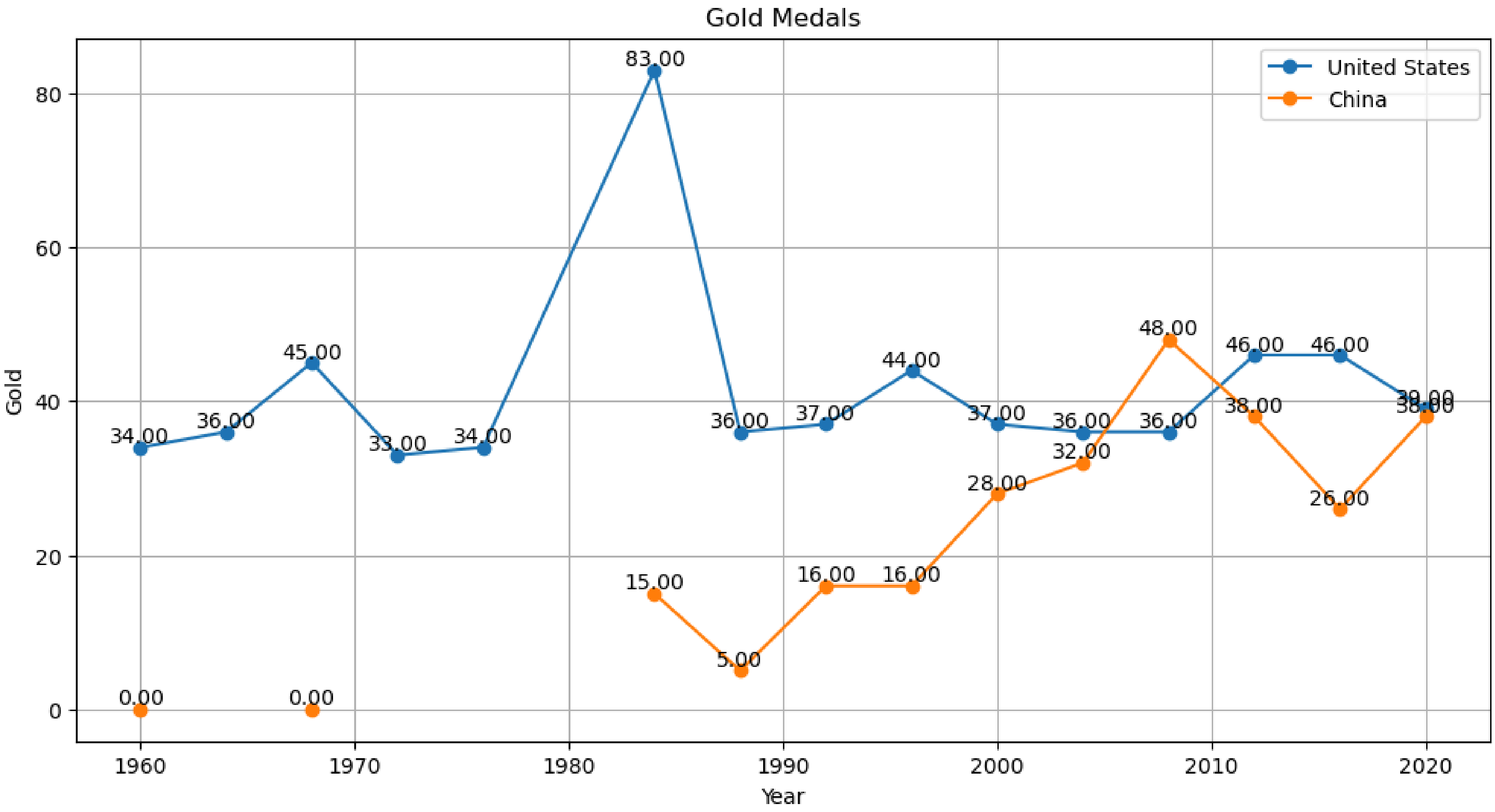
```python

# Add titles and labels
plt.title('Total Medals as a Proportion of Total Medals Each Year')
plt.xlabel('Year')
plt.ylabel('Total/Total_Medals_Year')
plt.legend()

# Annotate each point with its y-value
for year in pivot_data.index:
    if not pd.isna(pivot_data['China'][year]):
        plt.text(year, pivot_data['China'][year], f'{pivot_data["China"][year]:.2f}', ha='center', va='bottom')
    if not pd.isna(pivot_data['United States'][year]):
        plt.text(year, pivot_data['United States'][year], f'{pivot_data["United States"][year]:.2f}', ha='center', va='

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



In [34]:

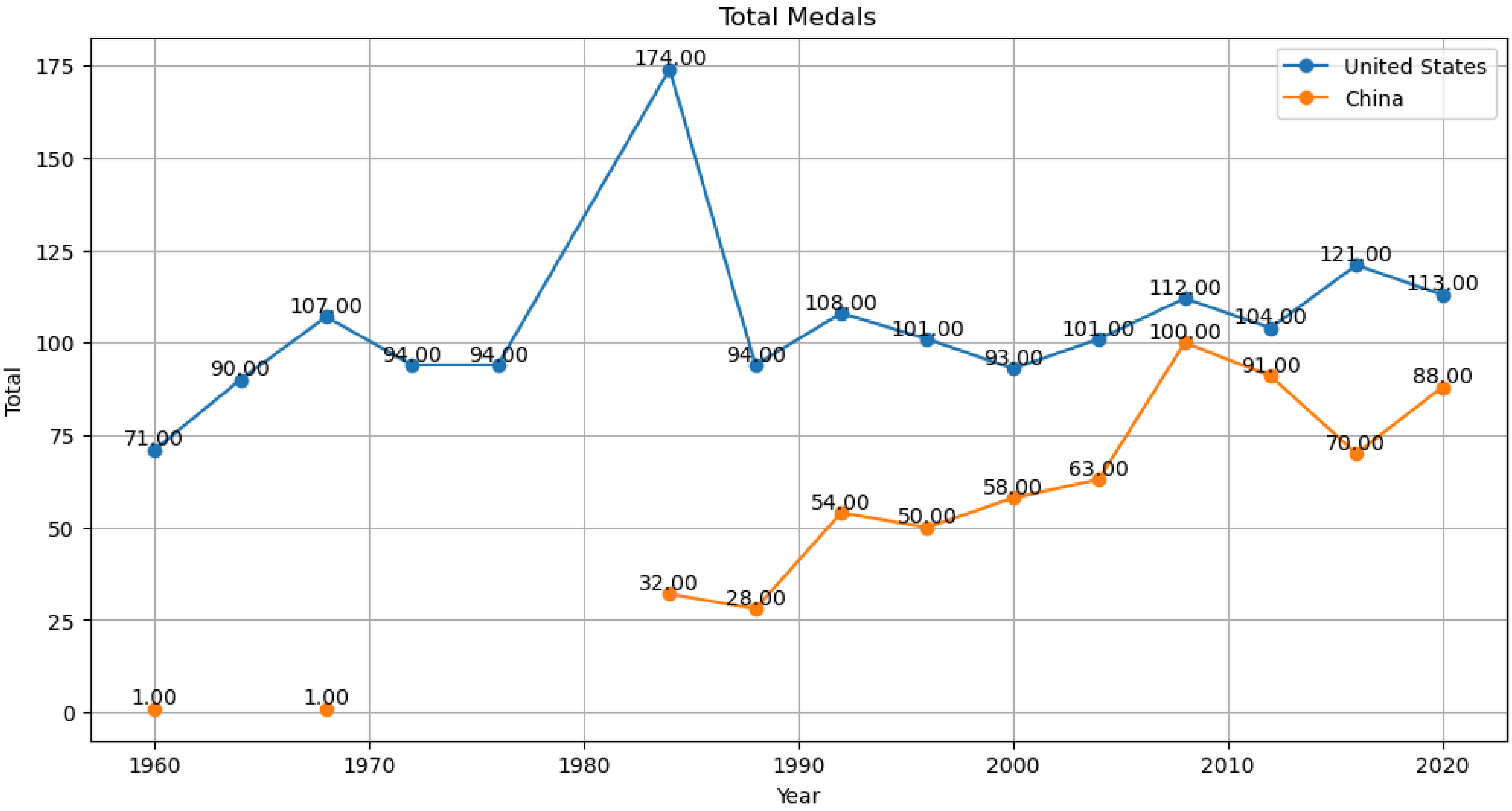
```
# Filter the data for China and the United States
filtered_data = medals3[(medals3['Country_Name'] == 'China') | (medals3['Country_Name'] == 'United States')]
# Pivot the data to have years as the index and countries as columns for the 'Gold/Total_Gold_Year' ratio
pivot_data = filtered_data.pivot(index='year', columns='Country_Name', values='Gold')

# Plot the data
plt.figure(figsize=(12, 6))
plt.plot(pivot_data.index, pivot_data['United States'], label='United States', marker='o')
plt.plot(pivot_data.index, pivot_data['China'], label='China', marker='o')

# Add titles and labels
plt.title('Gold Medals')
plt.xlabel('Year')
plt.ylabel('Gold')
plt.legend()
```

```
# Annotate each point with its y-value
for year in pivot_data.index:
    if not pd.isna(pivot_data['China'][year]):
        plt.text(year, pivot_data['China'][year], f'{pivot_data["China"][year]:.2f}', ha='center', va='bottom')
    if not pd.isna(pivot_data['United States'][year]):
        plt.text(year, pivot_data['United States'][year], f'{pivot_data["United States"][year]:.2f}', ha='center', va='

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



```
In [35]: # Filter the data for China and the United States
         filtered_data = medals3[(medals3['Country_Name'] == 'China') | (medals3['Country_Name'] == 'United States')]
         # Pivot the data to have years as the index and countries as columns for the 'Gold/Total_Gold_Year' ratio
```

```
pivot_data = filtered_data.pivot(index='year', columns='Country_Name', values='Total')

# Plot the data
plt.figure(figsize=(12, 6))
plt.plot(pivot_data.index, pivot_data['United States'], label='United States', marker='o')
plt.plot(pivot_data.index, pivot_data['China'], label='China', marker='o')

# Add titles and labels
plt.title('Total Medals')
plt.xlabel('Year')
plt.ylabel('Total')
plt.legend()

# Annotate each point with its y-value
for year in pivot_data.index:
    if not pd.isna(pivot_data['China'][year]):
        plt.text(year, pivot_data['China'][year], f'{pivot_data["China"][year]:.2f}', ha='center', va='bottom')
    if not pd.isna(pivot_data['United States'][year]):
        plt.text(year, pivot_data['United States'][year], f'{pivot_data["United States"][year]:.2f}', ha='center', va='

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



In [36]:

```
medals2[medals2['year'] == 1984]
```

Out[36]:

	year	Country_Name	Gold	Total	Total_Gold_Year	Total_Medals_Year	Gold/Total_Gold_Year	Total/Total_Medals_Year
195	1984	China	15	32	226	688	0.07	0.05
192	1984	United States	83	174	226	688	0.37	0.25
202	1984	Great Britain	5	37	226	688	0.02	0.05
203	1984	France	5	28	226	688	0.02	0.04
198	1984	Japan	10	32	226	688	0.04	0.05

In [37]:

```
gdp_ratios_data = pd.read_csv(r"C:\Users\lasra\Desktop\olympics\GDP_Ratios_Transformed_and_Merged.csv", encoding= 'unic
```

In [38]:
```
gdp_ratios_data.dtypes
```

Out[38]:
```
year                    int64
gdp_share_of_world    float64
country                object
dtype: object
```

In [39]:
```
gdp_ratios_data.head()
```

Out[39]:

	year	gdp_share_of_world	country
0	1960	0.40	United States
1	1961	0.39	United States
2	1962	0.39	United States
3	1963	0.38	United States
4	1964	0.37	United States

In [40]:
```
medals4 = medals3[(medals3['Country_Name'] == 'China') | (medals3['Country_Name'] == 'United States')]
```

In [41]:
```
# Merge the datasets
merged_data = pd.merge(medals4, gdp_ratios_data, left_on=['year', 'Country_Name'], right_on=['year', 'country'], how='l
```

In [42]:
```
merged_data
```

Out[42]:

	year	Country_Name	Gold	Total	Total_Gold_Year	Total_Medals_Year	Gold/Total_Gold_Year	Total/Total_Medals_Year	gdp_share_of_world
0	1960	United States	34	71	152	461	0.22	0.15	0.40
1	1960	China	0	1	152	461	0.00	0.00	0.04
2	1964	United States	36	90	163	504	0.22	0.18	0.37
3	1968	China	0	1	174	527	0.00	0.00	0.03
4	1968	United States	45	107	174	527	0.26	0.20	0.38
5	1972	United States	33	94	195	600	0.17	0.16	0.33
6	1976	United States	34	94	198	613	0.17	0.15	0.29
7	1984	China	15	32	226	688	0.07	0.05	0.02
8	1984	United States	83	174	226	688	0.37	0.25	0.32
9	1988	China	5	28	241	739	0.02	0.04	0.02
10	1988	United States	36	94	241	739	0.15	0.13	0.27
11	1992	China	16	54	260	815	0.06	0.07	0.02
12	1992	United States	37	108	260	815	0.14	0.13	0.26
13	1996	United States	44	101	271	842	0.16	0.12	0.25
14	1996	China	16	50	271	842	0.06	0.06	0.03
15	2000	United States	37	93	300	927	0.12	0.10	0.30
16	2000	China	28	58	300	927	0.09	0.06	0.04
17	2004	China	32	63	301	927	0.11	0.07	0.04
18	2004	United States	36	101	301	927	0.12	0.11	0.28

	year	Country_Name	Gold	Total	Total_Gold_Year	Total_Medals_Year	Gold/Total_Gold_Year	Total/Total_Medals_Year	gdp_share_of_world
19	2008	China	48	100	302	958	0.16	0.10	0.07
20	2008	United States	36	112	302	958	0.12	0.12	0.23
21	2012	China	38	91	302	960	0.13	0.09	0.11
22	2012	United States	46	104	302	960	0.15	0.11	0.21
23	2016	China	26	70	307	973	0.08	0.07	0.15
24	2016	United States	46	121	307	973	0.15	0.12	0.25
25	2020	China	38	88	340	1080	0.11	0.08	0.17
26	2020	United States	39	113	340	1080	0.11	0.10	0.25

In [43]:

```python
# Ensure the columns are present and relevant
relevant_columns = ['gdp_share_of_world', 'Gold/Total_Gold_Year', 'Total/Total_Medals_Year']

# Calculate the correlation matrix
correlation_matrix = merged_data[relevant_columns].corr()
```

In [44]:

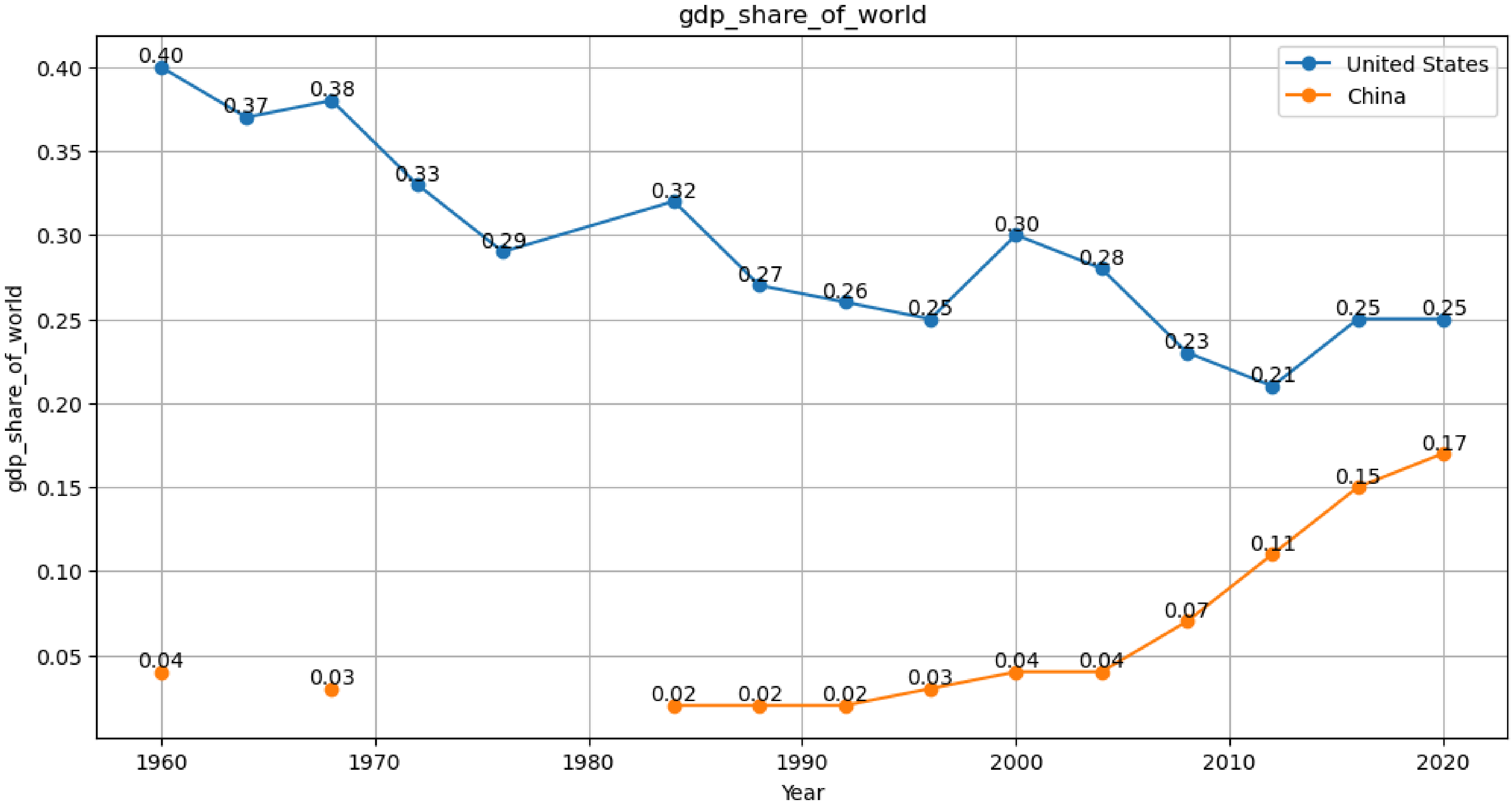
```python
correlation_matrix
```

Out[44]:

	gdp_share_of_world	Gold/Total_Gold_Year	Total/Total_Medals_Year
gdp_share_of_world	1.000000	0.767200	0.845472
Gold/Total_Gold_Year	0.767200	1.000000	0.963425
Total/Total_Medals_Year	0.845472	0.963425	1.000000

In [45]:

```python
# Filter the data for China and the United States
filtered_data = merged_data[(merged_data['Country_Name'] == 'China') | (merged_data['Country_Name'] == 'United States')
# Pivot the data to have years as the index and countries as columns for the 'Gold/Total_Gold_Year' ratio
pivot_data = filtered_data.pivot(index='year', columns='Country_Name', values='gdp_share_of_world')

# Plot the data
plt.figure(figsize=(12, 6))
plt.plot(pivot_data.index, pivot_data['United States'], label='United States', marker='o')
plt.plot(pivot_data.index, pivot_data['China'], label='China', marker='o')

# Add titles and labels
plt.title('gdp_share_of_world')
plt.xlabel('Year')
plt.ylabel('gdp_share_of_world')
plt.legend()

# Annotate each point with its y-value
for year in pivot_data.index:
    if not pd.isna(pivot_data['China'][year]):
        plt.text(year, pivot_data['China'][year], f'{pivot_data["China"][year]:.2f}', ha='center', va='bottom')
    if not pd.isna(pivot_data['United States'][year]):
        plt.text(year, pivot_data['United States'][year], f'{pivot_data["United States"][year]:.2f}', ha='center', va='

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



Trends in Medals

Proportion of Total Medals Each Year

- **United States**: The proportion of total medals won by the United States shows variability but remains relatively stable, indicating consistent overall performance at the Olympics. Despite some fluctuations, there is no clear long-term downtrend.
- **China**: The proportion of total medals won by China shows a clear upward trend, demonstrating improved overall performance at the Olympics in line with its economic growth. This consistent increase reflects China's growing competitive edge on the global stage.

Proportion of Gold Medals Each Year

- **United States**: The proportion of gold medals won by the United States exhibits some decline or stabilization at lower levels compared to historical peaks. While the United States continues to win a significant share of gold medals, there is a noticeable decrease from earlier years.
- **China**: The proportion of gold medals won by China is on a clear upward trend, reflecting significant improvements in their Olympic performance. This upward trend aligns with China's economic rise.

These observations confirm that while the US may have some variability and a potential downtrend in gold medals, its total medal count remains strong. In contrast, China is experiencing a consistent and significant upward trend in both gold and total medals.

Trends in GDP Share of the World

- **United States**: The GDP share of the United States shows a clear long-term downtrend, decreasing from 40% in 1960 to 25% in 2020. This reflects a relative decline in economic dominance over the period.
- **China**: The GDP share of China is on a significant upward trend, growing from a negligible percentage in 1960 to 17% in 2020. This dramatic increase reflects China's rapid economic growth and rising global economic influence.

Economic Growth and Olympic Success

- **Correlation Analysis**: The correlation matrix highlights strong positive correlations between the variables. Notably, there is a 0.77 correlation between GDP share of the world and the proportion of gold medals each year, indicating a potential link between economic power and Olympic success.

- **Economic Influence**: The data suggests a correlation between a country's economic power and its Olympic success. The United States, with a high GDP share, consistently wins more medals, while China’s rising GDP correlates with its increased medal counts.

- **Historical Performance**: The United States had a strong Olympic presence from 1960 to 2000. China's performance significantly improved post-2000, aligning with its economic growth.

Conclusion

The analysis underscores the interplay between economic power and sports success. Both the United States and China demonstrate that robust economic resources can enhance a nation's Olympic performance.

In [ ]:

```

```