In [1]:

```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
```

In [2]:

```
import numpy as np, pandas as pd, matplotlib.pyplot as plt, seaborn
from datetime import datetime, timedelta
from fredapi import Fred
import quandl
```

In [3]:

```
def get_info(names):
    data = []
    for i in range(len(names)):
        data.append(fred.get_series(names[i]).to_frame().rename(col
        data[i] = data[i].groupby(data[i].index.year).mean().dropna
    return data
```

In [4]:

```
# https://github.com/mortada/fredapi
fred = Fred(api_key="a02df0a22c57860f5f7cf25edc70ffb3")
quandl.ApiConfig.api_key = "QZLZXdHDDPZna9Yw48NP"
```

West - California

Define the variables to be used in analysis:

X attributes:

- *Monthly* Stocks
  - S&P 500 (MULTPL/SP500_REAL_PRICE_MONTH)
- *Quarterly* Gross Domestic Product (GDP)
- *Annual* Unemployment Rate (LAUST060000000000003A)
- *Annual* House Ownership Ratio (CAHOWN)
- *Annual* Resident Population (CAPOP)
- *Annual* Median Income Rate (MEHOINUSCAA672N)
- *Annual* Home Vacancy Rate (CAHVAC)

y attributes:

- *Quarterly* California State Housing Price Index (CASTHPI)

Connect to APIs and create a dataframe with information from each dataset:

In [5]:

```
sp500 = quandl.get('MULTPL/SP500_REAL_PRICE_MONTH').rename(columns=
names_ca = ['LAUST060000000000003A', "CAHOWN","CAPOP", "MEHOINUSCAA
sp500 = sp500.groupby(sp500.index.year).mean().dropna()
ca_data_series = get_info(names_ca) + [sp500]
```

In [6]:

```
# quarterly housing price index
caHPI = fred.get_series('CASTHPI').to_frame()
caHPI.index.name = "DATE"
caHPI = caHPI.rename(columns={0:"CASTHPI"})
# convert to annual
caHPI_annual = caHPI.groupby(caHPI.index.year).mean()
```

In [7]:

```
ca_annual = caHPI_annual.copy()
for df in ca_data_series:
    ca_annual = ca_annual.merge(df, left_index=True, right_index=Tr
ca_annual.tail()
```

Out[7]:

	CASTHPI	LAUST060000000000003A	CAHOWN	CAPOP	MEHOINU
2014	489.2725	7.5	54.2	38625.139	
2015	524.2275	6.2	54.3	38953.142	
2016	561.8125	5.5	53.8	39209.127	
2017	605.3800	4.8	54.4	39399.349	
2018	652.4350	4.2	55.1	39557.045	

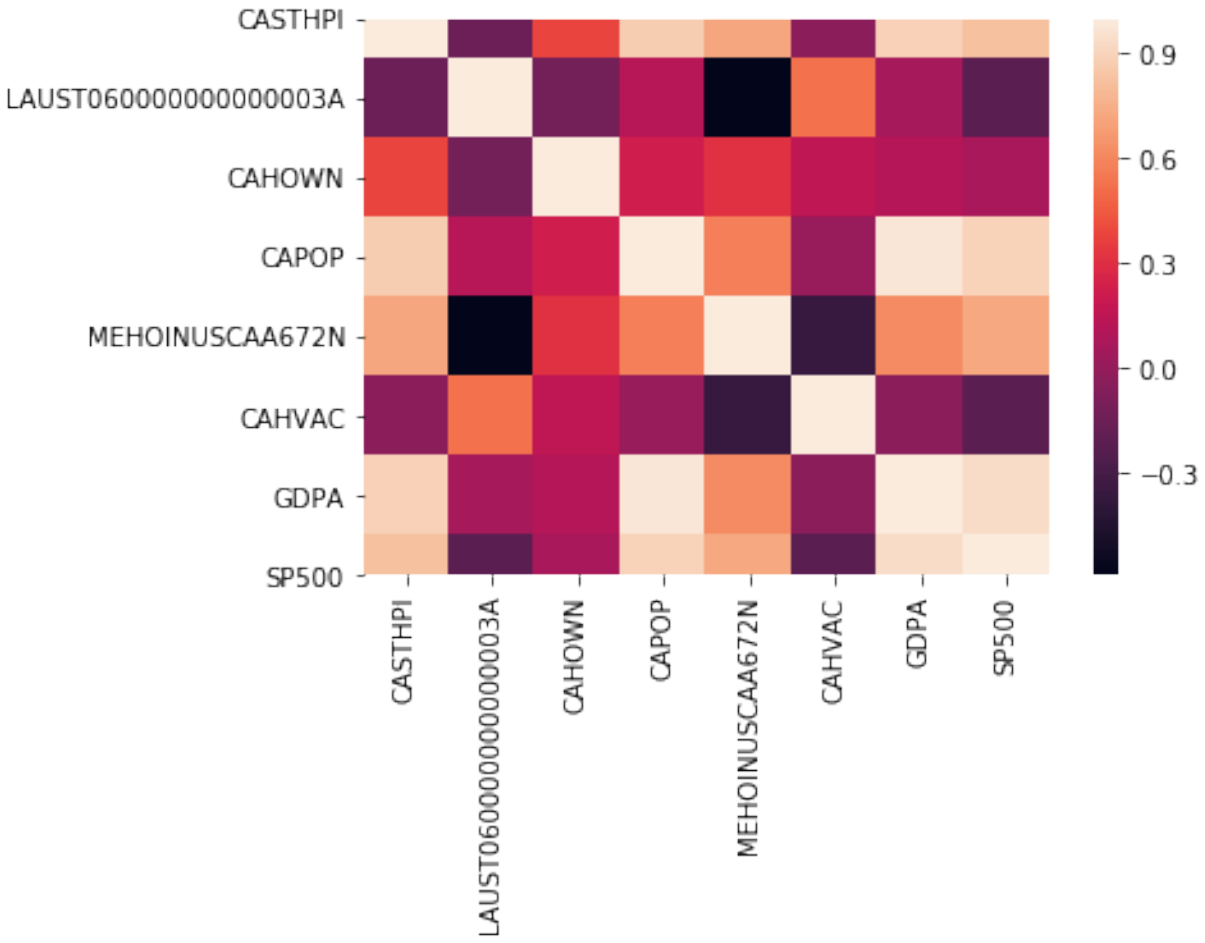
Analyze the correlation coefficient for each indicator we have specified:

In [8]:

```
corr = ca_annual.corr().round(4)
sns.heatmap(data=corr)
```

Out[8]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x123e8fd68>
```



In [9]:

```
corr
```

Out[9]:

	CASTHPI	LAUST060000000000003A	CAHOWN	C
CASTHPI	1.0000	-0.1523	0.3836	(
LAUST060000000000003A	-0.1523	1.0000	-0.1220	(
CAHOWN	0.3836	-0.1220	1.0000	(
CAPOP	0.8695	0.1263	0.2278	'
MEHOINUSCAA672N	0.7184	-0.5935	0.3126	(
CAHVAC	-0.0315	0.5236	0.1589	(
GDPA	0.8896	0.0619	0.1170	(
SP500	0.8241	-0.2165	0.0675	(

In [10]:

```
Create a model using linear regression to express the Case-Schiller
```

```
  File "<ipython-input-10-e7298399cefe>", line 1
    Create a model using linear regression to express
the Case-Schiller index as dependent on the other data
sets we have downloaded:
           ^
SyntaxError: invalid syntax
```

In [ ]:

```
X = ca_annual.drop(columns=['CASTHPI'], axis=1)
Y = ca_annual['CASTHPI']
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size
lin_model = LinearRegression()
lin_model.fit(X_train, Y_train)
```

In [ ]:

```
# model evaluation for training set
y_train_predict = lin_model.predict(X_train)
rmse = (np.sqrt(mean_squared_error(Y_train, y_train_predict)))
r2 = r2_score(Y_train, y_train_predict)

print("The model performance for training set")
print("--------------------------------------")
print('Root Mean Squared Error is {}'.format(rmse))
print('R-Squared score is {}'.format(r2))
print("\n")

# model evaluation for testing set
y_test_predict = lin_model.predict(X_test)
rmse = (np.sqrt(mean_squared_error(Y_test, y_test_predict)))
r2 = r2_score(Y_test, y_test_predict)

print("The model performance for testing set")
print("--------------------------------------")
print('Root Mean Squared Error is {}'.format(rmse))
print('R-Squared score is {}'.format(r2))
```

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In [2]:

In [3]:

In [4]:

West - California

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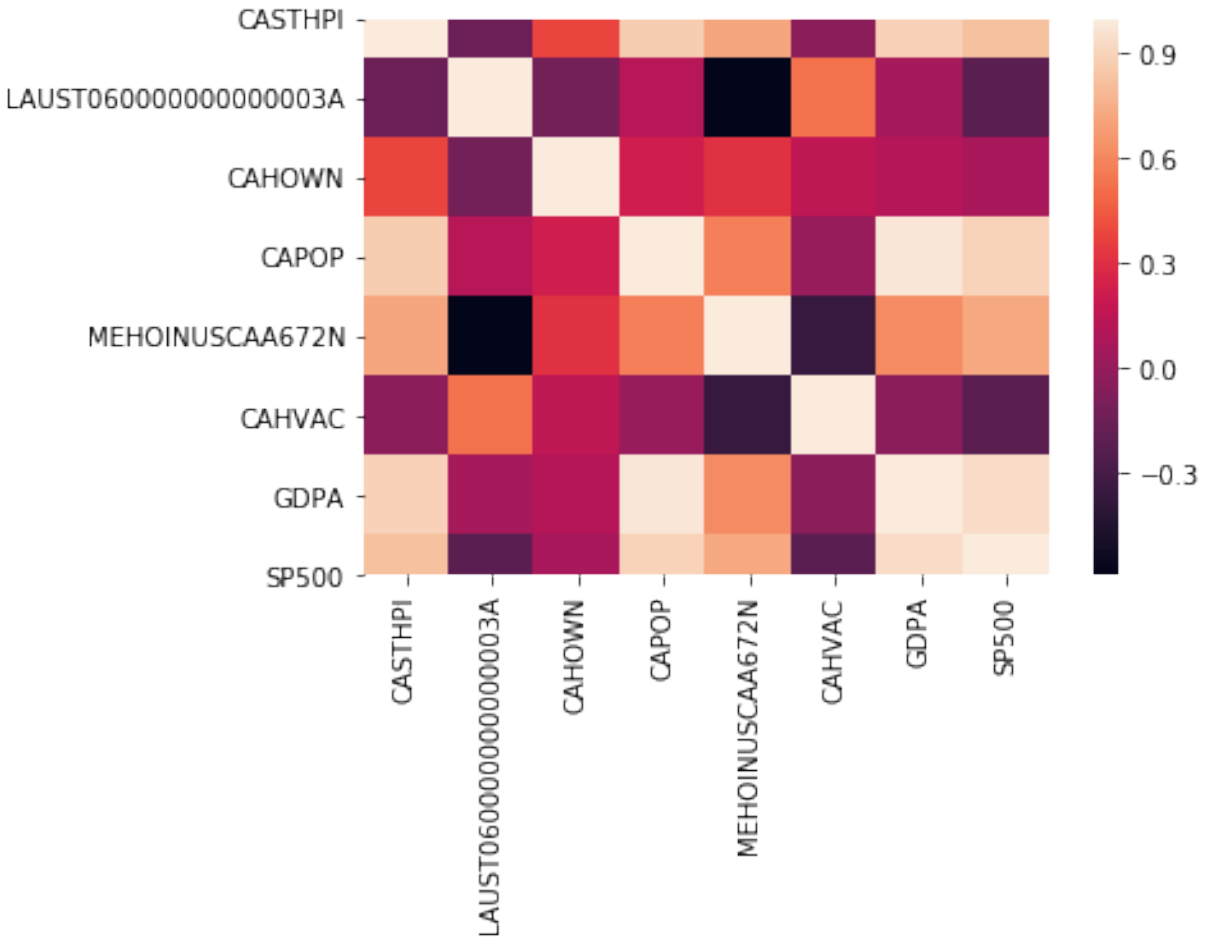

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```

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