

APS 502 Project
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Part (a)

Expected returns:

Asset name	Arithmetic expected return	Geometric expected return
SPY	0.0104	0.0099
GOVT	0.0024	0.0023
EEMV	0.0032	0.0026

Table 1: Asset 1 & 2 & 3 's expected returns

Covariance and standard deviation:

Covariance or standard deviation	SPY	GOVT	EEMV
SPY	0.0331	-0.0001	0.0007
GOVT	-0.0001	0.0108	0.0000
EEMV	0.0007	0.0000	0.0343

Table 2: Covariance between Asset 1 & 2 & 3, and standard deviation

Note: the numbers in diagonal are standard deviation of the assets (ie: square root of covariance)

Expected return goal, variance and optimal weights:

(Assume shorting selling is allowed)

Expected return of portfolio	Variance of portfolio (risk)	Weight of asset 1	Weight of asset 2	Weight of asset 3
0.0100	0.0003	1.0374	0.6134	-0.6509
0.0200	0.0018	2.3964	0.2034	-1.5998
0.0300	0.0047	3.7553	-0.2066	-2.5487
0.0400	0.0089	5.1142	-0.6166	-3.4976

0.0500	0.0145	6.4731	-1.0267	-4.4465
0.0600	0.0214	7.8321	-1.4367	-5.3954
0.0700	0.0297	9.1910	-1.8467	-6.3443
0.0800	0.0393	10.5499	-2.2567	-7.2932
0.0900	0.0503	11.9088	-2.6668	-8.2421
0.1000	0.0626	13.2677	-3.0768	-9.1910

Table 3: Return and variance of portfolio, and respective weights of the 3 assets

Efficient frontier:

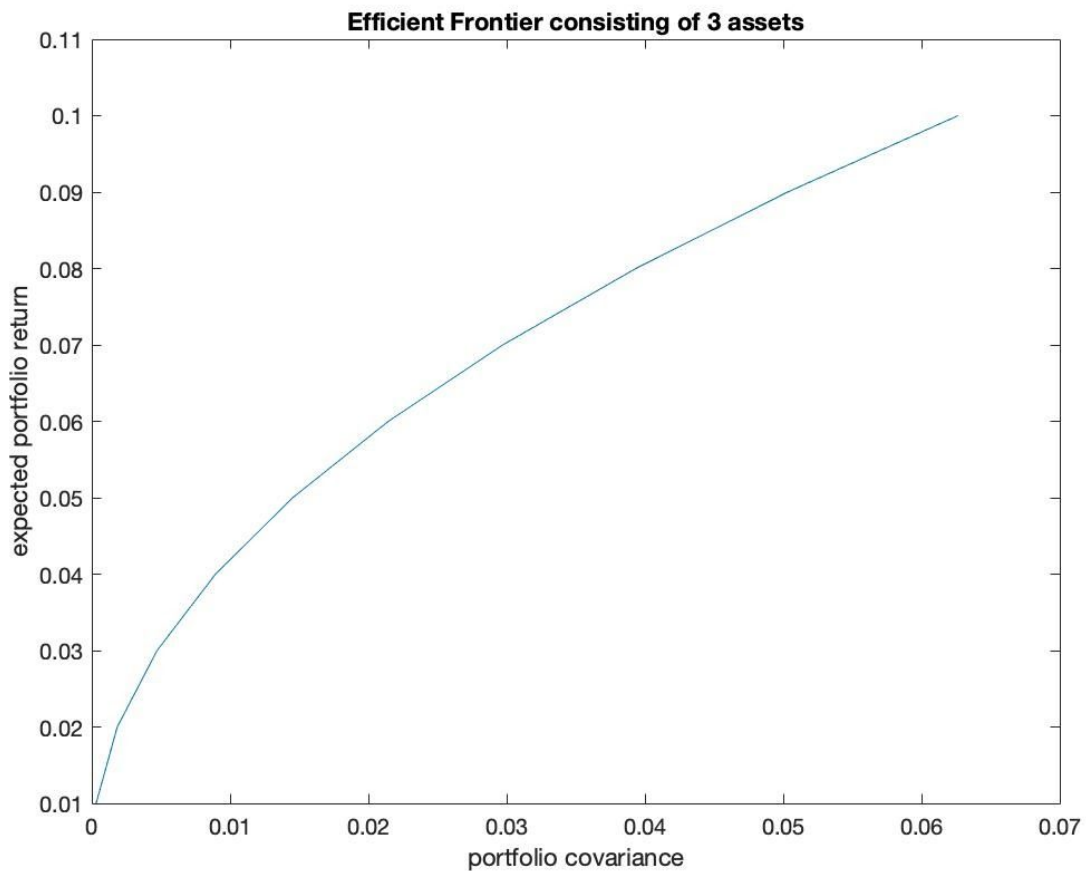


Figure 1: Efficient frontier of 3 assets

Part (b)

Expected returns:

Asset name	Arithmetic expected return	Geometric expected return
CME	0.0194	0.0184
BR	0.0196	0.0183
CBOE	0.0148	0.0131
ICE	0.0164	0.0153
ACN	0.0162	0.0150

Table 4: Asset 4 & 5 & 6 & 7 & 8 's expected returns

Covariance and standard deviation:

Cov or std deviation	SPY	GOVT	EEMV	CME	BR	CBOE	ICE	ACN
SPY	0.0331	-8.23e-5	7.20e-4	1.62e-4	7.72e-4	5.73e-5	4.53e-4	0.0011
GOVT	-8.23e-5	0.0108	2.05e-5	-2.64e-5	8.17e-5	7.26e-5	-4.84e-5	-5.19e-5
EEMV	7.20e-4	2.05e-5	0.0343	-2.54e-4	5.25e-4	-2.05e-4	-3.94e-5	4.69e-4
CME	1.62e-4	-2.64e-5	-2.54e-4	0.0464	6.81e-4	0.0011	0.0011	3.33e-4
BR	7.72e-4	8.17e-5	5.25e-4	6.81e-4	0.0517	2.41e-4	4.74e-4	0.0011
CBOE	5.73e-5	7.26e-5	-2.05e-4	0.0011	2.41e-4	0.0585	7.29e-4	2.81e-4
ICE	4.53e-4	-4.84e-5	-3.94e-5	0.0011	4.74e-4	7.29e-4	0.0461	6.60e-4
ACN	0.0011	-5.19e-5	4.69e-4	3.33e-4	0.0011	2.81e-4	6.60e-4	0.0484

Table 5: Covariance between Asset 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8, and standard deviation

Note: the numbers in diagonal are standard deviation of the assets (ie: square root of covariance)

Expected return goal, variance and optimal weights:

(Assume shorting selling is allowed)

Expected return of	Variance of portfolio	Weight of asset 1	Weight of asset 2	Weight of asset 3	Weight of asset 4	Weight of asset 5	Weight of asset 6	Weight of asset 7	Weight of asset 8
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portfolio	(risk)								
0.01	0.0002	0.2377	0.4985	-0.1330	0.1783	0.0876	0.0193	0.0598	0.0517
0.02	0.0008	0.3852	-0.0580	-0.2920	0.3771	0.3105	0.0708	0.1379	0.1485
0.03	0.0020	0.3727	-0.6145	-0.4510	0.5759	0.5333	0.1224	0.2160	0.2453
0.04	0.0037	0.4402	-1.1711	-0.6101	0.7747	0.7561	0.1739	0.2941	0.3421
0.05	0.0060	0.5077	-1.7276	-0.7691	0.9735	0.9790	0.2254	0.3722	0.4389
0.06	0.0088	0.5752	-2.2841	-0.9282	1.1723	1.2018	0.2770	0.4503	0.5357
0.07	0.0122	0.6427	-2.8407	-1.0872	1.3711	1.4247	0.3285	0.5284	0.6325
0.08	0.0161	0.7102	-3.3972	-1.2462	1.5699	1.6475	0.3800	0.6065	0.7293
0.09	0.0206	0.7777	-3.9537	-1.4053	1.7687	1.8703	0.4315	0.6846	0.8261
0.10	0.0257	0.8452	-4.5102	-1.5643	1.9605	2.0932	0.4831	0.7627	0.9229

Table 6: Return and variance of portfolio, and respective weights of the 8 assets

Efficient frontier:

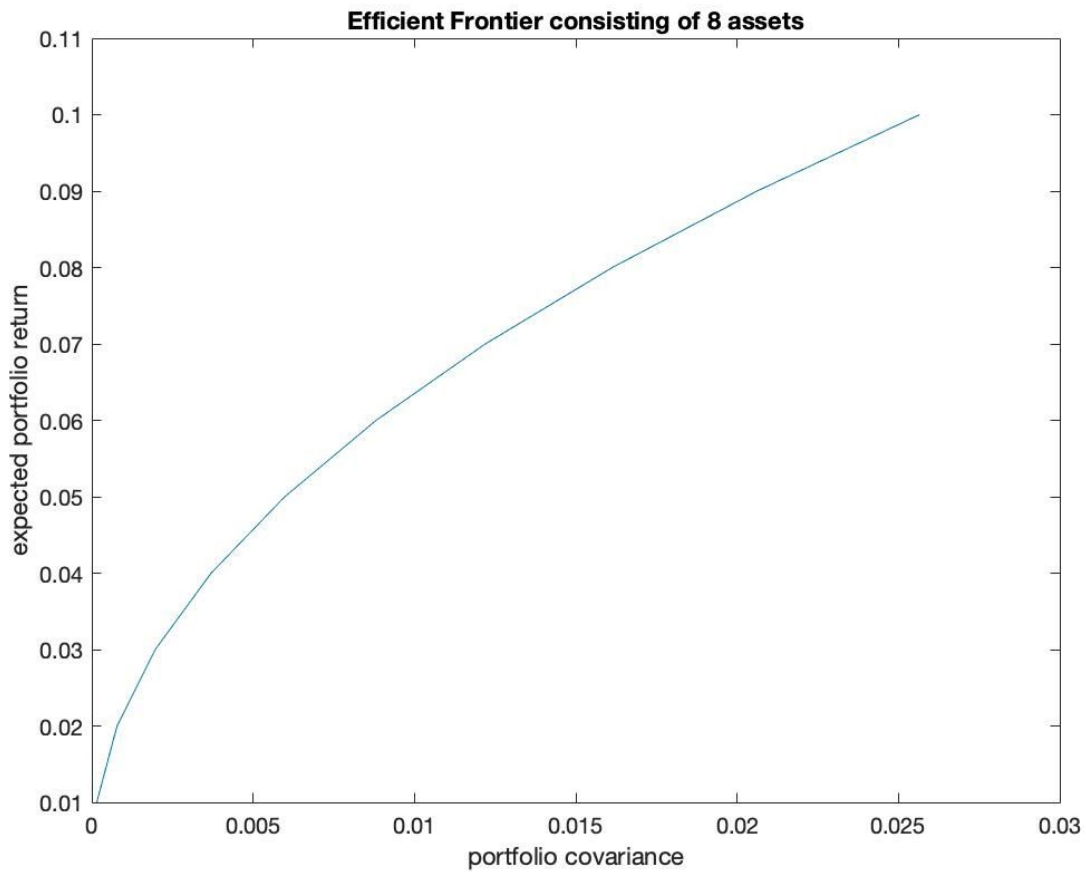


Figure 2: Efficient frontier of 8 assets

Comment on portfolio consisting of 3 assets and portfolio consisting of 8 assets:

Stocks in part (b) leads to a better portfolio.

As shown in the efficient frontiers, when the expected return goal is the same, the second portfolio has a smaller variance, which indicates under the same return, portfolio 2 has a smaller risk.

I think the reason for that is diversification. As said in lecture, portfolios can reduce risk (variance) without sacrificing mean return. In portfolio 2, more stocks are involved, therefore the risk is reduced.

Appendix

Matlab code

% read the datas

```
SPY = readmatrix('SPY.csv');
GOVT = readmatrix('GOVT.csv');
EEMV = readmatrix('EEMV.csv');
SPY2 = readmatrix('SPY_next.csv');
GOVT2 = readmatrix('GOVT_next.csv');
EEMV2 = readmatrix('EEMV_next.csv');
```

% calculate monthly return and expected return

```
SPY_close_1 = SPY(:, 6);
SPY_close_2 = SPY2(:, 6);
SPY_monthly_return = (SPY_close_2-SPY_close_1)./SPY_close_1;
SPY_expected_return = mean(SPY_monthly_return);
```

```
GOVT_close_1 = GOVT(:, 6);
GOVT_close_2 = GOVT2(:, 6);
GOVT_monthly_return = (GOVT_close_2-GOVT_close_1)./GOVT_close_1;
GOVT_expected_return = mean(GOVT_monthly_return);
```

```
EEMV_close_1 = EEMV(:, 6);
EEMV_close_2 = EEMV2(:, 6);
EEMV_monthly_return = (EEMV_close_2-EEMV_close_1)./EEMV_close_1;
EEMV_expected_return = mean(EEMV_monthly_return);
```

% calculate standard deviation & cov

```
cov_1_1 = ((SPY_monthly_return - SPY_expected_return).') * (SPY_monthly_return -
SPY_expected_return);
cov_1_1 = cov_1_1 / size(SPY_monthly_return, 1);
std_1 = sqrt(cov_1_1);
```

```
cov_1_2 = ((SPY_monthly_return - SPY_expected_return).') * (GOVT_monthly_return -
GOVT_expected_return);
cov_1_2 = cov_1_2 / size(SPY_monthly_return, 1);
```

```
cov_1_3 = ((SPY_monthly_return - SPY_expected_return).') * (EEMV_monthly_return -
EEMV_expected_return);
cov_1_3 = cov_1_3 / size(SPY_monthly_return, 1);
```

```

cov_2_2 = ((GOVT_monthly_return - GOVT_expected_return).') * (GOVT_monthly_return -
GOVT_expected_return);
cov_2_2 = cov_2_2 / size(GOVT_monthly_return, 1);
std_2 = sqrt(cov_2_2);

```

```

cov_2_3 = ((GOVT_monthly_return - GOVT_expected_return).') * (EEMV_monthly_return -
EEMV_expected_return);
cov_2_3 = cov_2_3 / size(GOVT_monthly_return, 1);

```

```

cov_3_3 = ((EEMV_monthly_return - EEMV_expected_return).') * (EEMV_monthly_return -
EEMV_expected_return);
cov_3_3 = cov_3_3 / size(EEMV_monthly_return, 1);
std_3 = sqrt(cov_3_3);

```

% calculate geometric expected return

```

g_SPY_return = 1;
g_GOVT_return = 1;
g_EEMV_return = 1;

```

```

for index = 1:72

```

```

    g_SPY_return = (1 + SPY_monthly_return(index,:)) * g_SPY_return;
    g_GOVT_return = (1 + GOVT_monthly_return(index,:)) * g_GOVT_return;
    g_EEMV_return = (1 + EEMV_monthly_return(index,:)) * g_EEMV_return;

```

```

end

```

```

g_SPY_return = g_SPY_return ^ (1/72) - 1;
g_GOVT_return = g_GOVT_return ^ (1/72) - 1;
g_EEMV_return = g_EEMV_return ^ (1/72) - 1;

```

```

Q = [cov_1_1, cov_1_2, cov_1_3;
     cov_1_2, cov_2_2, cov_2_3;
     cov_1_3, cov_2_3, cov_3_3];

```

```

c = [0, 0, 0]';

```

```

A = -[g_SPY_return, g_GOVT_return, g_EEMV_return];

```

```

port_return = -(0.01: 0.01: 0.1);

```

```

Aeq = [1 1 1];

```

```

beq = 1;

```

```

ub = [inf, inf, inf];

```

```

lb = [-inf; -inf; -inf];
x = zeros(3, 10);
port_cov = zeros(10, 1);

for index = 1:10
    [x(:,index), port_cov(index)] = quadprog(Q, c, A, port_return(index), Aeq, beq, lb, ub);
end

figure('Name','Efficient Frontier');
plot(port_cov, -port_return)
title('Efficient Frontier consisting of 3 assets');
xlabel('portfolio covariance');
ylabel('expected portfolio return');

% output print
fprintf('SPY arithmetic expected return is: %.4f\n', SPY_expected_return);
fprintf('SPY geometric expected return is: %.4f\n\n', g_SPY_return);
fprintf('GOVT arithmetic expected return is: %.4f\n', GOVT_expected_return);
fprintf('GOVT geometric expected return is: %.4f\n\n', g_GOVT_return);
fprintf('EEMV arithmetic expected return is: %.4f\n', EEMV_expected_return);
fprintf('EEMV geometric expected return is: %.4f\n\n', g_EEMV_return);

fprintf('SPY standard deviation is: %.4f\n', std_1);
fprintf('GOVT standard deviation is: %.4f\n', std_2);
fprintf('EEMV standard deviation is: %.4f\n\n', std_3);

fprintf('cov between SPY and GOVT is: %.4f\n', cov_1_2);
fprintf('cov between SPY and EEMV is: %.4f\n', cov_1_3);
fprintf('cov between GOVT and EEMV is: %.4f\n', cov_2_3);

fprintf('\nfirst column is the expected return, second is covariance, last three are weights of asset
1, 2 and 3');
table = [-port_return' port_cov x']

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% part 2 begins here
CME = readmatrix('CME.csv');

```



```

BR = readmatrix('BR.csv');
CBOE = readmatrix('CBOE.csv');
ICE = readmatrix('ICE.csv');
ACN = readmatrix('ACN.csv');
CME2 = readmatrix('CME_next.csv');
BR2 = readmatrix('BR_next.csv');
CBOE2 = readmatrix('CBOE_next.csv');
ICE2 = readmatrix('ICE_next.csv');
ACN2 = readmatrix('ACN_next.csv');

```

```

% calculate monthly return and expected return

```

```

CME_close_1 = CME(:, 6);
CME_close_2 = CME2(:, 6);
CME_monthly_return = (CME_close_2 - CME_close_1) ./ CME_close_1;
CME_expected_return = mean(CME_monthly_return);

```

```

BR_close_1 = BR(:, 6);
BR_close_2 = BR2(:, 6);
BR_monthly_return = (BR_close_2 - BR_close_1) ./ BR_close_1;
BR_expected_return = mean(BR_monthly_return);

```

```

CBOE_close_1 = CBOE(:, 6);
CBOE_close_2 = CBOE2(:, 6);
CBOE_monthly_return = (CBOE_close_2 - CBOE_close_1) ./ CBOE_close_1;
CBOE_expected_return = mean(CBOE_monthly_return);

```

```

ICE_close_1 = ICE(:, 6);
ICE_close_2 = ICE2(:, 6);
ICE_monthly_return = (ICE_close_2 - ICE_close_1) ./ ICE_close_1;
ICE_expected_return = mean(ICE_monthly_return);

```

```

ACN_close_1 = ACN(:, 6);
ACN_close_2 = ACN2(:, 6);
ACN_monthly_return = (ACN_close_2 - ACN_close_1) ./ ACN_close_1;
ACN_expected_return = mean(ACN_monthly_return);

```

```

% calculate standard deviation & cov

```

```

cov_1_4 = ((SPY_monthly_return - SPY_expected_return)') * (CME_monthly_return -
CME_expected_return);

```

cov_1_4 = cov_1_4 / size(SPY_monthly_return, 1);

cov_1_5 = ((SPY_monthly_return - SPY_expected_return).') * (BR_monthly_return - BR_expected_return);

cov_1_5 = cov_1_5 / size(SPY_monthly_return, 1);

cov_1_6 = ((SPY_monthly_return - SPY_expected_return).') * (CBOE_monthly_return - CBOE_expected_return);

cov_1_6 = cov_1_6 / size(SPY_monthly_return, 1);

cov_1_7 = ((SPY_monthly_return - SPY_expected_return).') * (ICE_monthly_return - ICE_expected_return);

cov_1_7 = cov_1_7 / size(SPY_monthly_return, 1);

cov_1_8 = ((SPY_monthly_return - SPY_expected_return).') * (ACN_monthly_return - ACN_expected_return);

cov_1_8 = cov_1_8 / size(SPY_monthly_return, 1);

cov_2_4 = ((GOVT_monthly_return - GOVT_expected_return).') * (CME_monthly_return - CME_expected_return);

cov_2_4 = cov_2_4 / size(GOVT_monthly_return, 1);

cov_2_5 = ((GOVT_monthly_return - GOVT_expected_return).') * (BR_monthly_return - BR_expected_return);

cov_2_5 = cov_2_5 / size(GOVT_monthly_return, 1);

cov_2_6 = ((GOVT_monthly_return - GOVT_expected_return).') * (CBOE_monthly_return - CBOE_expected_return);

cov_2_6 = cov_2_6 / size(GOVT_monthly_return, 1);

cov_2_7 = ((GOVT_monthly_return - GOVT_expected_return).') * (ICE_monthly_return - ICE_expected_return);

cov_2_7 = cov_2_7 / size(GOVT_monthly_return, 1);

cov_2_8 = ((GOVT_monthly_return - GOVT_expected_return).') * (ACN_monthly_return - ACN_expected_return);

cov_2_8 = cov_2_8 / size(GOVT_monthly_return, 1);

```
cov_3_4 = ((EEMV_monthly_return - EEMV_expected_return).') * (CME_monthly_return -  
CME_expected_return);  
cov_3_4 = cov_3_4 / size(EEMV_monthly_return, 1);
```

```
cov_3_5 = ((EEMV_monthly_return - EEMV_expected_return).') * (BR_monthly_return -  
BR_expected_return);  
cov_3_5 = cov_3_5 / size(EEMV_monthly_return, 1);
```

```
cov_3_6 = ((EEMV_monthly_return - EEMV_expected_return).') * (CBOE_monthly_return -  
CBOE_expected_return);  
cov_3_6 = cov_3_6 / size(EEMV_monthly_return, 1);
```

```
cov_3_7 = ((EEMV_monthly_return - EEMV_expected_return).') * (ICE_monthly_return -  
ICE_expected_return);  
cov_3_7 = cov_3_7 / size(EEMV_monthly_return, 1);
```

```
cov_3_8 = ((EEMV_monthly_return - EEMV_expected_return).') * (ACN_monthly_return -  
ACN_expected_return);  
cov_3_8 = cov_3_8 / size(CME_monthly_return, 1);
```

```
cov_4_4 = ((CME_monthly_return - CME_expected_return).') * (CME_monthly_return -  
CME_expected_return);  
cov_4_4 = cov_4_4 / size(CME_monthly_return, 1);  
std_4 = sqrt(cov_4_4);
```

```
cov_4_5 = ((CME_monthly_return - CME_expected_return).') * (BR_monthly_return -  
BR_expected_return);  
cov_4_5 = cov_4_5 / size(CME_monthly_return, 1);
```

```
cov_4_6 = ((CME_monthly_return - CME_expected_return).') * (CBOE_monthly_return -  
CBOE_expected_return);  
cov_4_6 = cov_4_6 / size(CME_monthly_return, 1);
```

```
cov_4_7 = ((CME_monthly_return - CME_expected_return).') * (ICE_monthly_return -  
ICE_expected_return);  
cov_4_7 = cov_4_7 / size(CME_monthly_return, 1);
```

```
cov_4_8 = ((CME_monthly_return - CME_expected_return).') * (ACN_monthly_return -  
ACN_expected_return);
```

```
cov_4_8 = cov_4_8 / size(CME_monthly_return, 1);
```

```
cov_5_5 = ((BR_monthly_return - BR_expected_return).') * (BR_monthly_return -  
BR_expected_return);
```

```
cov_5_5 = cov_5_5 / size(BR_monthly_return, 1);
```

```
std_5 = sqrt(cov_5_5);
```

```
cov_5_6 = ((BR_monthly_return - BR_expected_return).') * (CBOE_monthly_return -  
CBOE_expected_return);
```

```
cov_5_6 = cov_5_6 / size(BR_monthly_return, 1);
```

```
cov_5_7 = ((BR_monthly_return - BR_expected_return).') * (ICE_monthly_return -  
ICE_expected_return);
```

```
cov_5_7 = cov_5_7 / size(BR_monthly_return, 1);
```

```
cov_5_8 = ((BR_monthly_return - BR_expected_return).') * (ACN_monthly_return -  
ACN_expected_return);
```

```
cov_5_8 = cov_5_8 / size(BR_monthly_return, 1);
```

```
cov_6_6 = ((CBOE_monthly_return - CBOE_expected_return).') * (CBOE_monthly_return -  
CBOE_expected_return);
```

```
cov_6_6 = cov_6_6 / size(CBOE_monthly_return, 1);
```

```
std_6 = sqrt(cov_6_6);
```

```
cov_6_7 = ((CBOE_monthly_return - CBOE_expected_return).') * (ICE_monthly_return -  
ICE_expected_return);
```

```
cov_6_7 = cov_6_7 / size(CBOE_monthly_return, 1);
```

```
cov_6_8 = ((CBOE_monthly_return - CBOE_expected_return).') * (ACN_monthly_return -  
ACN_expected_return);
```

```
cov_6_8 = cov_6_8 / size(CBOE_monthly_return, 1);
```

```
cov_7_7 = ((ICE_monthly_return - ICE_expected_return).') * (ICE_monthly_return -  
ICE_expected_return);
```

```
cov_7_7 = cov_7_7 / size(ICE_monthly_return, 1);
```

```
std_7 = sqrt(cov_7_7);
```

```
cov_7_8 = ((ICE_monthly_return - ICE_expected_return).') * (ACN_monthly_return -  
ACN_expected_return);
```

```
cov_7_8 = cov_7_8 / size(ICE_monthly_return, 1);
```

```
cov_8_8 = ((ACN_monthly_return - ACN_expected_return).') * (ACN_monthly_return -  
ACN_expected_return);
```

```
cov_8_8 = cov_8_8 / size(ACN_monthly_return, 1);
```

```
std_8 = sqrt(cov_8_8);
```

```
% calculate geometric expected return
```

```
g_CME_return = 1;
```

```
g_BR_return = 1;
```

```
g_CBOE_return = 1;
```

```
g_ICE_return = 1;
```

```
g_ACN_return = 1;
```

```
for index = 1:72
```

```
    g_CME_return = (1 + CME_monthly_return(index,:)) * g_CME_return;
```

```
    g_BR_return = (1 + BR_monthly_return(index,:)) * g_BR_return;
```

```
    g_CBOE_return = (1 + CBOE_monthly_return(index,:)) * g_CBOE_return;
```

```
    g_ICE_return = (1 + ICE_monthly_return(index,:)) * g_ICE_return;
```

```
    g_ACN_return = (1 + ACN_monthly_return(index,:)) * g_ACN_return;
```

```
end
```

```
g_CME_return = g_CME_return ^ (1/72) - 1;
```

```
g_BR_return = g_BR_return ^ (1/72) - 1;
```

```
g_CBOE_return = g_CBOE_return ^ (1/72) - 1;
```

```
g_ICE_return = g_ICE_return ^ (1/72) - 1;
```

```
g_ACN_return = g_ACN_return ^ (1/72) - 1;
```

```
Q_2 = [cov_1_1, cov_1_2, cov_1_3, cov_1_4, cov_1_5, cov_1_6, cov_1_7, cov_1_8;
```

```
    cov_1_2, cov_2_2, cov_2_3, cov_2_4, cov_2_5, cov_2_6, cov_2_7, cov_2_8;
```

```
    cov_1_3, cov_2_3, cov_3_3, cov_3_4, cov_3_5, cov_3_6, cov_3_7, cov_3_8;
```

```
    cov_1_4, cov_2_4, cov_3_4, cov_4_4, cov_4_5, cov_4_6, cov_4_7, cov_4_8;
```

```
    cov_1_5, cov_2_5, cov_3_5, cov_4_5, cov_5_5, cov_5_6, cov_5_7, cov_5_8;
```

```
    cov_1_6, cov_2_6, cov_3_6, cov_4_6, cov_5_6, cov_6_6, cov_6_7, cov_6_8;
```

```
    cov_1_7, cov_2_7, cov_3_7, cov_4_7, cov_5_7, cov_6_7, cov_7_7, cov_7_8;
```

```
    cov_1_8, cov_2_8, cov_3_8, cov_4_8, cov_5_8, cov_6_8, cov_7_8, cov_8_8];
```

```
c_2 = [0, 0, 0, 0, 0, 0, 0, 0];
```

```

A_2 = -[g_SPY_return, g_GOVT_return, g_EEMV_return, g_CME_return, g_BR_return,
g_CBOE_return, g_ICE_return, g_ACN_return];
port_return_2 = -(0.01: 0.01: 0.1);
Aeq_2 = [1 1 1 1 1 1 1 1];
beq_2 = 1;
ub_2 = [inf; inf; inf; inf; inf; inf; inf; inf];
lb_2 = [-inf; -inf; -inf; -inf; -inf; -inf; -inf; -inf];
x_2 = zeros(8, 10);
port_cov_2 = zeros(10, 1);

for index = 1:10
    [x_2(:,index), port_cov_2(index)] = quadprog(Q_2, c_2, A_2, port_return_2(index), Aeq_2,
    beq_2, lb_2, ub_2);
end

figure('Name','Efficient Frontier');
plot(port_cov_2, -port_return_2)
title('Efficient Frontier consisting of 8 assets');
xlabel('portfolio covariance');
ylabel('expected portfolio return');

fprintf('\nfirst column is the expected return, second is covariance, last eight are weights of asset
1 to 3');
table_2 = [-port_return_2' port_cov_2 x_2']

```

Matlab output

SPY arithmetic expected return is: 0.0104

SPY geometric expected return is: 0.0099

GOVT arithmetic expected return is: 0.0024

GOVT geometric expected return is: 0.0023

EEMV arithmetic expected return is: 0.0032

EEMV geometric expected return is: 0.0026

SPY standard deviation is: 0.0331
GOVT standard deviation is: 0.0108
EEMV standard deviation is: 0.0343

cov between SPY and GOVT is: -0.0001
cov between SPY and EEMV is: 0.0007
cov between GOVT and EEMV is: 0.0000

first column is the expected return, second is covariance, last three are weights of asset 1, 2 and 3
table =

0.0100	0.0003	1.0374	0.6134	-0.6509
0.0200	0.0018	2.3964	0.2034	-1.5998
0.0300	0.0047	3.7553	-0.2066	-2.5487
0.0400	0.0089	5.1142	-0.6166	-3.4976
0.0500	0.0145	6.4731	-1.0267	-4.4465
0.0600	0.0214	7.8321	-1.4367	-5.3954
0.0700	0.0297	9.1910	-1.8467	-6.3443
0.0800	0.0393	10.5499	-2.2567	-7.2932
0.0900	0.0503	11.9088	-2.6668	-8.2421
0.1000	0.0626	13.2677	-3.0768	-9.1910

first column is the expected return, second is covariance, last eight are weights of asset 1 to 8
table_2 =

0.0100	0.0002	0.2377	0.4985	-0.1330	0.1783	0.0876	0.0193	0.0598	0.0517
0.0200	0.0008	0.3052	-0.0580	-0.2920	0.3771	0.3105	0.0708	0.1379	0.1485
0.0300	0.0020	0.3727	-0.6145	-0.4510	0.5759	0.5333	0.1224	0.2160	0.2453
0.0400	0.0037	0.4402	-1.1711	-0.6101	0.7747	0.7561	0.1739	0.2941	0.3421
0.0500	0.0060	0.5077	-1.7276	-0.7691	0.9735	0.9790	0.2254	0.3722	0.4389
0.0600	0.0088	0.5752	-2.2841	-0.9282	1.1723	1.2018	0.2770	0.4503	0.5357
0.0700	0.0122	0.6427	-2.8407	-1.0872	1.3711	1.4247	0.3285	0.5284	0.6325
0.0800	0.0161	0.7102	-3.3972	-1.2462	1.5699	1.6475	0.3800	0.6065	0.7293
0.0900	0.0206	0.7777	-3.9537	-1.4053	1.7687	1.8703	0.4315	0.6846	0.8261
0.1000	0.0257	0.8452	-4.5102	-1.5643	1.9675	2.0932	0.4831	0.7627	0.9229

Data

SPY

Date	Open	High	Low	Close	Adj Close	Volume
2014-01-01	183.979996	184.940002	176.880005	178.179993	157.445129	2530650900
2014-02-01	177.970001	187.149994	173.710007	186.289993	164.611374	2394184600
2014-03-01	184.649994	189.020004	183.75	187.009995	165.247635	2554084300
2014-04-01	187.619995	189.699997	181.309998	188.309998	167.130768	2345902000
2014-05-01	188.220001	192.800003	186.009995	192.679993	171.009186	1781093800
2014-06-01	192.949997	196.600006	191.970001	195.720001	173.707306	1675047300
2014-07-01	196.199997	199.059998	192.970001	193.089996	172.194305	1893710200
2014-08-01	192.559998	200.820007	190.550003	200.710007	178.989639	1829885000
2014-09-01	200.970001	201.899994	196.050003	197.020004	175.69902	2106462700
2014-10-01	196.699997	201.820007	181.919998	201.660004	180.67746	3943068000
2014-11-01	201.919998	207.869995	200.059998	207.199997	185.641068	1571091800
2014-12-01	206.399994	212.970001	197.860001	205.539993	184.153793	3045171000
2015-01-01	206.380005	206.880005	198.550003	199.449997	179.683716	3183506000
2015-02-01	200.050003	212.240005	197.860001	210.660004	189.782761	1901638100
2015-03-01	210.779999	212.059998	204.119995	206.429993	185.971954	2749923000
2015-04-01	206.389999	212.479996	204.509995	208.460007	188.639069	2036685200
2015-05-01	209.399994	213.779999	206.759995	211.139999	191.064285	1892519900
2015-06-01	211.940002	213.339996	205.279999	205.850006	186.277267	2535242600
2015-07-01	207.729996	213.179993	204.110001	210.5	191.411682	2452758000
2015-08-01	210.460007	211.309998	182.399994	199.160004	181.100021	4340428600
2015-09-01	193.119995	202.889999	186.929993	191.630005	174.252869	3279512900
2015-10-01	192.080002	209.440002	189.119995	208.889999	190.935181	3220136500
2015-11-01	208.320007	211.660004	202.179993	208.690002	190.75235	1924512800

2015-12-01	209.440002	211	199.830002	203.869995	186.34668	2924882300
2016-01-01	200.490005	201.899994	181.020004	193.720001	178.122925	3712950900
2016-02-01	192.529999	196.679993	181.089996	193.559998	177.9758	2920730800
2016-03-01	195.009995	206.869995	194.449997	205.520004	188.97287	2323306500
2016-04-01	204.350006	210.919998	203.089996	206.330002	190.696152	1910635600
2016-05-01	206.919998	210.690002	202.779999	209.839996	193.940231	1828530900
2016-06-01	209.119995	212.520004	198.649994	209.479996	193.607468	2612406900
2016-07-01	209.479996	217.539993	207.059998	217.119995	201.712112	1648453700
2016-08-01	217.190002	219.600006	214.25	217.380005	201.95369	1519703200
2016-09-01	217.369995	219.220001	212.309998	216.300003	200.950333	2292393000
2016-10-01	215.820007	216.699997	211.210007	212.550003	198.463913	1725687400
2016-11-01	212.929993	221.820007	208.380005	220.380005	205.775024	2073824400
2016-12-01	220.729996	228.339996	219.149994	223.529999	208.716263	1821910200
2017-01-01	225.039993	229.710007	223.880005	227.529999	213.7034	1482408500
2017-02-01	227.529999	237.309998	226.820007	236.470001	222.100098	1365136600
2017-03-01	238.389999	240.320007	231.610001	235.740005	221.414474	1921474100
2017-04-01	235.800003	239.529999	232.509995	238.080002	224.585098	1549613700
2017-05-01	238.679993	242.080002	235.429993	241.440002	227.754623	1492547000
2017-06-01	241.970001	245.009995	239.960007	241.800003	228.094208	1572753000
2017-07-01	242.880005	248	240.339996	246.770004	233.917709	1055908800
2017-08-01	247.460007	248.910004	241.830002	247.490005	234.60022	1557031500
2017-09-01	247.919998	251.320007	244.949997	251.229996	238.145416	1286405100
2017-10-01	251.490005	257.890015	251.289993	257.149994	244.966751	1320624600
2017-11-01	258.040009	266.049988	255.630005	265.01001	252.454422	1365620900
2017-12-01	264.76001	268.600006	260.76001	266.859985	254.216766	1715222900

2018-01-01	267.839996	286.630005	267.399994	281.899994	269.916779	1985506700
2018-02-01	281.070007	283.059998	252.919998	271.649994	260.102539	2923722000
2018-03-01	271.410004	280.410004	257.829987	263.149994	251.963898	2323561800
2018-04-01	262.549988	271.299988	254.669998	264.51001	254.280426	1998466500
2018-05-01	263.869995	274.25	259.049988	270.940002	260.461731	1606397200
2018-06-01	272.410004	279.480011	268.48999	271.279999	260.788605	1599001000
2018-07-01	269.51001	284.369995	269.23999	281.329987	271.664337	1266892500
2018-08-01	281.559998	291.73999	279.160004	290.309998	280.335785	1308443700
2018-09-01	289.839996	293.940002	286.709991	290.720001	280.73175	1228103300
2018-10-01	292.109985	293.209991	259.850006	270.630005	262.514984	3024345800
2018-11-01	271.600006	281.220001	263.070007	275.649994	267.38443	2021061200
2018-12-01	280.279999	280.399994	233.759995	249.919998	242.425949	3102780500
2019-01-01	245.979996	270.470001	243.669998	269.929993	263.36499	2048691700
2019-02-01	270.149994	281.309998	267.829987	278.679993	271.90213	1371716300
2019-03-01	280.440002	285.179993	272.420013	282.480011	275.609772	1678081300
2019-04-01	284.700012	294.450012	284.399994	294.019989	288.13266	1209204700
2019-05-01	294.720001	294.950012	275.23999	275.269989	269.758087	1845593200
2019-06-01	275.309998	296.309998	273.089996	293	287.133087	1340324000
2019-07-01	296.679993	302.230011	294.329987	297.429993	292.892029	1110504200
2019-08-01	297.600006	300.869995	281.720001	292.450012	287.988037	2031106700
2019-09-01	290.570007	302.630005	289.269989	296.769989	292.242065	1303830000
2019-10-01	297.73999	304.549988	284.820007	303.329987	300.081421	1386748300
2019-11-01	304.920013	315.480011	304.73999	314.309998	310.943817	1037123500
2019-12-01	314.589996	323.799988	307.130005	321.859985	318.412933	1285175800
2020-01-01	323.540009	332.950012	320.359985	321.730011	319.849213	1392003800

GOVT

Date	Open	High	Low	Close	Adj Close	Volume
2014-01-01	24.280001	24.629999	24.26	24.6	22.367327	1054500
2014-02-01	24.59	24.690001	24.49	24.65	22.412798	820100
2014-03-01	24.67	24.68	24.450001	24.530001	22.324566	649900
2014-04-01	24.52	24.75	24.42	24.690001	22.489336	815500
2014-05-01	24.75	24.950001	24.610001	24.860001	22.666368	1152300
2014-06-01	24.879999	24.889999	24.620001	24.790001	22.625456	1642800
2014-07-01	24.83	24.93	24.6	24.74	22.600725	972100
2014-08-01	24.879999	25.030001	24.709999	25.01	22.870443	1414600
2014-09-01	24.93	24.98	24.639999	24.82	22.71966	1961100
2014-10-01	24.879999	25.52	24.809999	25.049999	22.953136	2392500
2014-11-01	25.040001	25.309999	24.91	25.24	23.148684	1829300
2014-12-01	25.209999	25.389999	24.98	25.15	23.091032	2845900
2015-01-01	25.25	25.940001	25.16	25.889999	23.820625	7216300
2015-02-01	25.76	25.85	25.200001	25.41	23.37899	21346700
2015-03-01	25.379999	25.629999	25.07	25.540001	23.524946	9926200
2015-04-01	25.58	26	25.27	25.360001	23.380312	3953800
2015-05-01	25.290001	25.719999	25.040001	25.26	23.310942	4040700
2015-06-01	25.27	25.440001	24.83	25.02	23.107677	9401800
2015-07-01	24.92	25.27	24.91	25.26	23.347836	5138900
2015-08-01	25.23	25.59	25.1	25.209999	23.325846	5149400
2015-09-01	25.290001	25.48	25.07	25.41	23.536987	6498800
2015-10-01	25.41	25.610001	25.24	25.309999	23.470434	7383700
2015-11-01	25.209999	25.25	24.950001	25.18	23.375637	9228300

2015-12-01	25.15	25.299999	24.98	25.059999	23.290922	7979000
2016-01-01	25.17	25.620001	25.07	25.6	23.845884	19102100
2016-02-01	25.52	26.25	25.5	25.809999	24.041481	13746000
2016-03-01	25.790001	25.82	25.450001	25.799999	24.060373	17309600
2016-04-01	25.76	25.93	25.549999	25.709999	23.97644	7199700
2016-05-01	25.690001	25.889999	25.620001	25.709999	23.97644	9135500
2016-06-01	25.709999	26.299999	25.65	26.24	24.499292	8276900
2016-07-01	26.299999	26.450001	26.049999	26.33	24.613955	19431600
2016-08-01	26.190001	26.26	26.040001	26.110001	24.436232	12645000
2016-09-01	26.02	26.200001	25.84	26.08	24.435991	10580100
2016-10-01	26.07	26.07	25.68	25.77	24.172382	18528300
2016-11-01	25.67	25.83	24.940001	24.99	23.465939	17998300
2016-12-01	24.9	25.040001	24.719999	24.93	23.435972	31855100
2017-01-01	24.879999	25.15	24.84	25.01	23.560307	60848200
2017-02-01	24.92	25.17	24.879999	25.08	23.626253	24836500
2017-03-01	24.91	25.120001	24.73	25.049999	23.621605	23687900
2017-04-01	25.030001	25.370001	25.01	25.200001	23.789616	21356400
2017-05-01	25.16	25.34	25.01	25.32	23.931553	15684400
2017-06-01	25.27	25.469999	25.24	25.26	23.906149	22226500
2017-07-01	25.23	25.370001	25.110001	25.27	23.947775	13652800
2017-08-01	25.209999	25.549999	25.200001	25.5	24.19735	17173000
2017-09-01	25.459999	25.6	25.219999	25.24	23.983847	22292600
2017-10-01	25.25	25.290001	25.049999	25.139999	23.921659	16936200
2017-11-01	25.120001	25.25	25.059999	25.09	23.906286	12791300
2017-12-01	25.09	25.219999	24.940001	25.08	23.931028	25359000

2018-01-01	25.08	25.09	24.700001	24.75	23.683258	43843700
2018-02-01	24.73	24.75	24.42	24.540001	23.482309	35116400
2018-03-01	24.5	24.73	24.459999	24.690001	23.661215	21088400
2018-04-01	24.639999	24.73	24.34	24.459999	23.474279	27377400
2018-05-01	24.41	24.75	24.26	24.610001	23.654642	17592000
2018-06-01	24.5	24.66	24.389999	24.629999	23.711668	54250500
2018-07-01	24.610001	24.66	24.43	24.469999	23.598864	18589900
2018-08-01	24.360001	24.67	24.360001	24.610001	23.771526	19839700
2018-09-01	24.52	24.559999	24.27	24.34	23.552107	21236900
2018-10-01	24.27	24.32	24.059999	24.200001	23.457628	30501300
2018-11-01	24.129999	24.370001	24.049999	24.370001	23.662271	38144900
2018-12-01	24.280001	24.82	24.280001	24.65	23.977739	54542500
2019-01-01	24.82	25	24.66	24.9	24.304262	145438400
2019-02-01	24.85	24.9	24.73	24.790001	24.196896	47516500
2019-03-01	24.700001	25.280001	24.66	25.24	24.681721	54837500
2019-04-01	25.120001	25.129999	24.93	25.09	24.576677	100158700
2019-05-01	25.07	25.67	24.99	25.65	25.171097	62208400
2019-06-01	25.65	25.860001	25.57	25.82	25.38345	110888800
2019-07-01	25.76	25.870001	25.59	25.77	25.379814	69986300
2019-08-01	25.77	26.690001	25.75	26.59	26.229044	99296400
2019-09-01	26.58	26.68	25.92	26.33	26.014978	77282800
2019-10-01	26.200001	26.57	26.01	26.290001	26.017529	118608400
2019-11-01	26.219999	26.26	25.82	26.17	25.939165	86320100
2019-12-01	26.02	26.25	25.860001	25.940001	25.751354	81829500
2020-01-01	26.42	26.6	25.940001	26.59	26.477863	125772600

EEMV

Date	Open	High	Low	Close	Adj Close	Volume
2014-01-01	57.59	57.59	53.049999	53.52	45.944656	9817700
2014-02-01	53.439999	55.709999	52.27	55.439999	47.592888	6311900
2014-03-01	54.869999	57.439999	54.349998	57.200001	49.103779	6244000
2014-04-01	57.580002	58.880001	56.93	58.240002	49.996582	8557500
2014-05-01	58.189999	60.330002	58.09	59.599998	51.164082	3168800
2014-06-01	59.740002	60.869999	59.369999	60.07	51.567547	3807800
2014-07-01	60.549999	62	60.310001	60.650002	52.68642	3777100
2014-08-01	60.720001	63.209999	60.599998	62.610001	54.389069	3761000
2014-09-01	62.709999	63.68	59.32	59.799999	51.948036	4534000
2014-10-01	59.66	60.790001	57.689999	60.560001	52.608246	9789900
2014-11-01	60.52	60.619999	58.860001	59.27	51.487625	5313600
2014-12-01	58.73	58.900002	54.130001	56.630001	49.194267	12096100
2015-01-01	56.619999	58.790001	54.959999	57.299999	50.53072	8098300
2015-02-01	57.849998	59.130001	57.48	58.75	51.809422	7013600
2015-03-01	58.700001	59.099998	56.299999	59.009998	52.0387	8071700
2015-04-01	59.59	63.709999	59.369999	62.23	54.878292	8193300
2015-05-01	62.459999	62.810001	60.029999	60.07	52.973476	9161800
2015-06-01	60.119999	60.119999	56.970001	57.68	50.865826	9040500
2015-07-01	57.950001	58.209999	54.459999	55.490002	49.435947	12195300
2015-08-01	55.119999	55.619999	45.27	51.290001	45.694176	16056800
2015-09-01	50.380001	52.439999	48.119999	49.82	44.384544	12807500
2015-10-01	50.110001	54.16	49.529999	52.34	46.629616	12932600
2015-11-01	52.599998	53.619999	50.02	50.299999	44.812187	11033600

2015-12-01	50.459999	50.73	47.23	48.66	43.351112	20401200
2016-01-01	47.529999	47.790001	43.439999	47	42.429657	18045900
2016-02-01	46.689999	48.009998	45.32	47.029999	42.456741	13067000
2016-03-01	47.73	51.689999	47.689999	51.369999	46.374718	18674800
2016-04-01	50.689999	52.66	49.630001	51.459999	46.455963	15432400
2016-05-01	51.43	51.610001	48.810001	50.169998	45.291405	15636600
2016-06-01	50.029999	52.380001	48.630001	51.59	46.573326	18339800
2016-07-01	51.830002	53.139999	50.360001	53.09	48.533417	15732500
2016-08-01	53.220001	54.84	52.560001	53.27	48.697968	19535700
2016-09-01	53.310001	54.860001	52.110001	54.060001	49.420166	18932400
2016-10-01	54.060001	54.32	52.380001	52.830002	48.295734	14048400
2016-11-01	53.080002	53.490002	49.09	50.220001	45.909744	21038700
2016-12-01	50.029999	51.02	47.799999	50.639999	46.293697	22242400
2017-01-01	49.110001	51.209999	48.939999	50.73	47.067871	14274600
2017-02-01	50.810001	52.52	50.549999	51.709999	47.977123	13332200
2017-03-01	51.959999	54.200001	51.259998	53.5	49.637905	14045400
2017-04-01	53.720001	54.57	53.040001	54.27	50.352322	7647400
2017-05-01	54.400002	55.759998	54.060001	55.299999	51.307964	8281100
2017-06-01	55.5	56.240002	54.869999	55.400002	51.400745	9573000
2017-07-01	55.630001	57.68	54.849998	57.099998	53.386555	6321800
2017-08-01	57.330002	58.25	56.369999	58.139999	54.358921	6453100
2017-09-01	58.349998	59.060001	57.549999	58.099998	54.321518	9549700
2017-10-01	58.02	59.880001	58	59.189999	55.340633	8190400
2017-11-01	59.540001	60.52	58.720001	59.200001	55.349983	7779600
2017-12-01	59.139999	61.080002	58.599998	60.759998	56.808533	6774700

2018-01-01	61.419998	65.550003	61.259998	64.470001	61.283325	8750200
2018-02-01	64.010002	64.290001	58.919998	61.209999	58.184456	14083000
2018-03-01	61.689999	63.189999	60.5	62.34	59.258606	7403600
2018-04-01	62.200001	63.110001	60.68	61.139999	58.11792	11676200
2018-05-01	60.84	61.779999	59.919998	60.889999	57.88028	6928100
2018-06-01	61.23	62.02	56.740002	57.84	54.981037	4966600
2018-07-01	57.27	59.959999	57.040001	59.880001	57.411201	6232400
2018-08-01	59.639999	59.990002	56.75	59.169998	56.730469	10691400
2018-09-01	58.549999	59.470001	57.029999	59.299999	56.855114	13139200
2018-10-01	59.490002	59.490002	53.099998	54.98	52.713223	17976900
2018-11-01	55.34	57.77	54.919998	57.360001	54.995098	12039600
2018-12-01	58.130001	58.299999	54.790001	55.869999	53.566528	23011200
2019-01-01	55.360001	59.43	54.98	59.380001	57.816887	16364900
2019-02-01	59.330002	59.919998	58.110001	58.75	57.203468	16516500
2019-03-01	59.110001	60.25	57.709999	59.27	57.709782	19027600
2019-04-01	59.560001	60.27	59.18	59.919998	58.342667	17995800
2019-05-01	60.060001	60.290001	55.759998	57.099998	55.596901	19129200
2019-06-01	57.490002	59.209999	56.970001	58.860001	57.310574	9223200
2019-07-01	59.439999	59.439999	57.32	57.810001	56.904034	20315600
2019-08-01	57.84	58.130001	55.09	56.790001	55.900017	15470300
2019-09-01	56.27	58.349998	56.099998	57.09	56.195316	9077100
2019-10-01	56.919998	58.779999	56.220001	58.360001	57.445412	8181900
2019-11-01	58.799999	59.700001	57.009998	57.040001	56.146099	8197200
2019-12-01	57.02	58.880001	56.599998	58.66	57.740711	7973700
2020-01-01	58.860001	59.580002	55.279999	55.450001	55.450001	12298000

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Date	Open	High	Low	Close	Adj Close	Volume
2014-01-01	77.959999	79.970001	72.110001	74.760002	58.218391	50138800
2014-02-01	74.480003	78	70.519997	73.82	57.486366	33483800
2014-03-01	73.18	77.75	72.769997	74.019997	57.642113	37553900
2014-04-01	74.419998	75	66.440002	70.389999	55.154507	44145400
2014-05-01	70.809998	72.480003	67.540001	72	56.416058	29519900
2014-06-01	72.059998	72.489998	69.160004	70.949997	55.593307	29454300
2014-07-01	70.980003	76.220001	69.739998	73.940002	58.330563	30970100
2014-08-01	73.709999	77.419998	72.25	76.550003	60.389565	28218500
2014-09-01	76.580002	83.660004	75.300003	79.959999	63.079666	34046100
2014-10-01	79.959999	83.879997	75.940002	83.809998	66.525864	41854800
2014-11-01	84.110001	86.400002	82.510002	84.639999	67.184715	24498400
2014-12-01	84.589996	93.910004	84.010002	88.650002	70.367737	34081700
2015-01-01	89.220001	89.970001	83.43	85.300003	69.569794	31165900
2015-02-01	85.839996	97.120003	84.769997	95.93	78.239487	27778900
2015-03-01	95.730003	100.610001	93.68	94.709999	77.244453	41158800
2015-04-01	94.480003	94.980003	88.220001	90.910004	74.530106	34832700
2015-05-01	91.639999	96.489998	89.760002	94.199997	77.227325	25663400
2015-06-01	94.480003	99.220001	92.309998	93.059998	76.292725	33900500
2015-07-01	93.830002	100.870003	93.110001	96.040001	79.148262	29545500
2015-08-01	96.370003	98.660004	84.330002	94.440002	77.829643	34771700
2015-09-01	92.349998	96.230003	89.300003	92.739998	76.428658	37164000
2015-10-01	92.830002	97.82	86.980003	94.470001	78.277824	31161000
2015-11-01	94.959999	98.870003	94.059998	97.650002	80.912773	22718600

2015-12-01	98.190002	100.080002	90.160004	90.599998	75.071144	34946500
2016-01-01	88.800003	89.940002	81.870003	89.849998	77.189583	41290600
2016-02-01	89.779999	94.449997	85.470001	91.440002	78.555555	38903200
2016-03-01	91.790001	97.739998	89.870003	96.050003	82.515961	36489100
2016-04-01	95.82	97.519997	89	91.910004	79.468826	47809500
2016-05-01	92.599998	99	92	97.889999	84.639381	28137300
2016-06-01	97.790001	98.230003	92.290001	97.400002	84.215698	35670100
2016-07-01	97.010002	103.339996	95.599998	102.239998	88.956291	24917300
2016-08-01	102.580002	109.620003	102.300003	108.349998	94.27243	25498500
2016-09-01	108.529999	110.349998	104.199997	104.519997	90.940048	32532600
2016-10-01	104.089996	105.650002	99.18	100.099998	87.582237	24145000
2016-11-01	100.529999	117.800003	98.949997	112.910004	98.790337	46602100
2016-12-01	113.589996	124.010002	113	115.349998	100.925209	34496200
2017-01-01	116.160004	121.690002	113.269997	121.080002	109.421616	28773100
2017-02-01	121.5	123.550003	115.599998	121.459999	109.765022	31014300
2017-03-01	123.010002	127.599998	117.099998	118.800003	107.361145	37027300
2017-04-01	118.82	120.790001	114.82	116.190002	105.56633	28141200
2017-05-01	116.550003	119.18	114.879997	117.290001	106.565765	30369300
2017-06-01	117.529999	127.959999	116.620003	125.239998	113.788857	29856600
2017-07-01	125.330002	127.360001	119.300003	122.620003	112.039246	27270900
2017-08-01	123.650002	127.769997	120.32	125.800003	114.944832	25575400
2017-09-01	125.629997	136.259995	124.510002	135.679993	123.972305	23876300
2017-10-01	135.729996	138.490005	132.330002	137.169998	125.981232	27299200
2017-11-01	137.990005	151.850006	135.610001	140.089996	128.66301	34540400
2017-12-01	151.460007	155.289993	144.839996	146.050003	134.136871	31452700

2018-01-01	146.119995	156.490005	143.679993	153.479996	144.979446	26649300
2018-02-01	155.399994	169.520004	149.380005	166.160004	156.957199	38728800
2018-03-01	166.369995	171.710007	156.429993	161.740005	152.781982	44678000
2018-04-01	161.619995	166.649994	155.399994	157.679993	149.567902	32834000
2018-05-01	157.559998	166.139999	153.899994	162.899994	154.519318	34144900
2018-06-01	164.410004	174.360001	162.389999	163.919998	155.486862	34789200
2018-07-01	163.479996	171.990005	158.350006	159.119995	151.54509	26967600
2018-08-01	159.860001	175	158.860001	174.729996	166.411957	27889800
2018-09-01	174.729996	177.360001	170.039993	170.210007	162.107147	25134400
2018-10-01	171.350006	185.110001	170.490005	183.240005	175.223816	42523600
2018-11-01	183.759995	197.080002	182.970001	190.080002	181.764572	53588500
2018-12-01	190.100006	192.889999	174.5	188.119995	179.890335	42551400
2019-01-01	186.460007	188.080002	177.210007	182.279999	176.649292	35473000
2019-02-01	182.979996	185.220001	172.759995	181.910004	176.290726	36639500
2019-03-01	182.449997	183.970001	161.050003	164.580002	159.496033	42298300
2019-04-01	165.660004	179.979996	164.75	178.899994	174.123138	33376900
2019-05-01	174.710007	193.270004	171.009995	192.119995	186.990143	35039700
2019-06-01	192.449997	204.559998	190.970001	194.110001	188.927032	29569100
2019-07-01	195.470001	207.839996	193.089996	194.419998	189.937851	25056300
2019-08-01	194.050003	217.740005	193.649994	217.289993	212.280609	26753500
2019-09-01	216.070007	224.910004	201.779999	211.339996	206.467789	28620300
2019-10-01	211.339996	217.789993	196.949997	205.75	201.684753	29249200
2019-11-01	206.910004	208.779999	195.789993	202.729996	198.724426	23399700
2019-12-01	202.800003	207.960007	198.350006	200.720001	196.754135	27186100
2020-01-01	201.110001	220.350006	200.580002	217.110001	216.256668	27653000

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Date	Open	High	Low	Close	Adj Close	Volume
2014-01-01	39.529999	39.810001	35.889999	36.290001	32.179443	22491200
2014-02-01	36.310001	37.889999	34.939999	37.759998	33.482925	13046700
2014-03-01	37.400002	39	35.939999	37.139999	32.933151	13608800
2014-04-01	37.290001	38.34	35.349998	38.34	34.184761	11403100
2014-05-01	38.34	41.43	37.93	41.02	36.574322	11710700
2014-06-01	41.130001	42.32	40.290001	41.639999	37.127117	11507700
2014-07-01	41.689999	42.299999	40.150002	40.369999	36.179119	10940500
2014-08-01	40.209999	42.560001	39.43	42.540001	38.123848	14267000
2014-09-01	42.52	43.400002	41.07	41.630001	37.308311	10705100
2014-10-01	41.650002	44.130001	38.279999	43.93	39.618423	12634900
2014-11-01	43.98	45.959999	43.669998	45.290001	40.844959	9225600
2014-12-01	45.18	46.779999	43.080002	46.18	41.64761	10792200
2015-01-01	46.25	48.990002	44.639999	47.990002	43.54068	12948600
2015-02-01	48.150002	53.970001	47.209999	53.23	48.294861	16537600
2015-03-01	53.18	55.119999	50.91	55.009998	49.909832	12179900
2015-04-01	54.830002	55.779999	52.400002	53.919998	49.176712	10506300
2015-05-01	54.16	54.93	50.549999	54.18	49.413849	15264300
2015-06-01	54.32	54.73	49.669998	50.009998	45.61068	12517300
2015-07-01	50.310001	54.68	50.310001	54.27	49.753517	13514900
2015-08-01	54.360001	59.509998	49.009998	52.790001	48.396694	14003800
2015-09-01	51.700001	56.259998	50.41	55.349998	50.743645	17462400
2015-10-01	55.490002	60.110001	54.200001	59.580002	54.936256	12597600
2015-11-01	59.57	59.75	54.110001	54.98	50.69479	17394900

2015-12-01	55.200001	55.380001	52.200001	53.73	49.54221	16863700
2016-01-01	52.91	54	48.560001	53.560001	49.6689	14530500
2016-02-01	53.169998	57.060001	50.299999	56.130001	52.052197	16262800
2016-03-01	56.549999	59.650002	55.529999	59.310001	55.001179	10430900
2016-04-01	59.009998	61.060001	58.200001	59.84	55.787842	12868900
2016-05-01	59.939999	66.050003	57.919998	64.190002	59.843285	32447100
2016-06-01	63.959999	65.199997	61.41	65.199997	60.784878	17730900
2016-07-01	65.25	68.440002	64.959999	67.68	63.392807	10195300
2016-08-01	67.739998	70.150002	66.389999	69.300003	64.910202	16421800
2016-09-01	69.309998	71.739998	67.269997	67.790001	63.495831	13243300
2016-10-01	67.660004	68.239998	63.720001	64.660004	60.851185	10457900
2016-11-01	64.68	66.989998	59.860001	64.739998	60.926468	14915600
2016-12-01	64.720001	67.080002	63.279999	66.300003	62.394581	9694900
2017-01-01	66.519997	67.889999	65.220001	66.529999	62.926804	7578800
2017-02-01	67	70.610001	65.519997	69.330002	65.575157	11843400
2017-03-01	69.650002	70.809998	66.82	67.949997	64.269905	9151800
2017-04-01	67.839996	70.489998	66.489998	69.940002	66.471779	7668400
2017-05-01	70	76.029999	68.160004	75.889999	72.12674	12478500
2017-06-01	76	78	73.550003	75.559998	71.81311	10484100
2017-07-01	75.739998	76.870003	73.910004	75.860001	72.419014	7028700
2017-08-01	76.190002	78.239998	71.580002	78.129997	74.586044	11054700
2017-09-01	78.139999	82.019997	77.470001	80.82	77.154015	8837900
2017-10-01	80.760002	86.220001	80.699997	85.919998	82.400772	7879500
2017-11-01	86.139999	91.75	85.879997	88.660004	85.028549	19851000
2017-12-01	90.110001	92.440002	88.120003	90.580002	86.869911	9110300

2018-01-01	90.720001	97.540001	90.379997	96.410004	92.839806	8072400
2018-02-01	96.290001	102.199997	87.510002	100.379997	96.662796	14516500
2018-03-01	100.529999	110.050003	98.540001	109.690002	105.628044	20242200
2018-04-01	109.110001	112.589996	105.879997	107.209999	103.588768	14215200
2018-05-01	107.199997	118.360001	106.510002	115.449997	111.550453	18408800
2018-06-01	116.300003	119.989998	113.209999	115.099998	111.212257	48851000
2018-07-01	114.510002	120.650002	112.230003	112.980003	109.509224	14553400
2018-08-01	112.980003	135.649994	111.650002	135.139999	130.988464	20275900
2018-09-01	135.25	138.240005	130.830002	131.949997	127.896454	14255400
2018-10-01	132.649994	133.699997	111.360001	116.940002	113.748154	20262900
2018-11-01	117.209999	119.889999	96.339996	105.870003	102.980301	31418500
2018-12-01	107.169998	107.279999	91.339996	96.25	93.622871	22132100
2019-01-01	94.760002	102.160004	92.440002	100.830002	98.555916	14208400
2019-02-01	100.870003	104.349998	93.769997	101.25	98.966446	21242400
2019-03-01	101.989998	104.769997	97.370003	103.690002	101.351418	19551900
2019-04-01	104.510002	118.650002	104.080002	118.129997	116.009468	20674900
2019-05-01	118.339996	125.769997	114.529999	124.870003	122.628471	20215500
2019-06-01	124.940002	133.449997	122.449997	127.68	125.388039	15684100
2019-07-01	129.320007	136.990005	126.449997	127.120003	125.300369	12012600
2019-08-01	126.360001	131.660004	120.279999	129.440002	127.587151	16731600
2019-09-01	128.550003	132.110001	122.75	124.43	122.648865	9180500
2019-10-01	125.050003	126.709999	118.989998	125.220001	123.964592	13334700
2019-11-01	125.629997	126.769997	115.150002	123.709999	122.469727	11448000
2019-12-01	123.650002	124.949997	118.620003	123.540001	122.30143	11894600
2020-01-01	124.690002	134.300003	115.389999	119.150002	118.491241	12413300

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Date	Open	High	Low	Close	Adj Close	Volume
2014-01-01	51.889999	52.450001	48.220001	52.02	48.019932	14161700
2014-02-01	52.099998	57.259998	49	54.029999	49.875366	12910200
2014-03-01	53.299999	59.279999	53	56.599998	52.422947	13680200
2014-04-01	56.720001	56.98	49.299999	53.360001	49.422054	13957700
2014-05-01	53.349998	53.73	48.169998	50.68	46.939838	12217300
2014-06-01	50.700001	51.59	46.84	49.209999	45.740307	18459600
2014-07-01	49.080002	49.759998	46.52	48.470001	45.052479	15911400
2014-08-01	48.470001	54.16	47.02	53.029999	49.290966	14126800
2014-09-01	53.169998	56.360001	52.509998	53.529999	49.950359	11608800
2014-10-01	53.610001	59.099998	52.900002	58.939999	54.998573	15297500
2014-11-01	59.25	63.27	58.689999	59.91	55.903717	11879400
2014-12-01	59.82	65.389999	59.240002	63.419998	59.389023	12510700
2015-01-01	63.880001	68	62.810001	64.470001	60.372288	11957100
2015-02-01	64.449997	65.860001	59.380001	60.029999	56.214489	14214200
2015-03-01	59.849998	61.16	56.57	57.41	53.941708	17341000
2015-04-01	57.110001	58.810001	55.259998	56.27	52.87059	14601900
2015-05-01	56.790001	59.610001	55.040001	58.52	54.984661	12719500
2015-06-01	58.73	59.639999	56.419998	57.220001	53.955868	11641600
2015-07-01	57.41	62.75	57.41	61.98	58.444317	12116300
2015-08-01	61.919998	64.599998	58.25	63.259998	59.651302	11949900
2015-09-01	62.650002	67.220001	62.259998	67.080002	63.253376	11449200
2015-10-01	67.330002	69.43	64.129997	67.040001	63.448872	15701800
2015-11-01	67.43	72.529999	67.43	72.209999	68.341927	10868100

2015-12-01	71.25	71.25	63.650002	64.900002	61.423496	15420900
2016-01-01	64.550003	66.860001	61	66.620003	63.257915	15579400
2016-02-01	66.290001	66.620003	58.43	62.5	59.345829	13303700
2016-03-01	62.709999	67.410004	62.029999	65.330002	62.033024	10096000
2016-04-01	65.099998	66.949997	61.220001	61.959999	59.0476	9206000
2016-05-01	61.580002	64.900002	61.43	63.650002	60.658165	8184600
2016-06-01	63.080002	66.620003	62.189999	66.620003	63.488564	11534900
2016-07-01	66.769997	69.480003	65.629997	68.800003	65.803871	7191400
2016-08-01	68.800003	69.440002	66.43	68.690002	65.698669	7977000
2016-09-01	68.739998	71.050003	64.620003	64.849998	62.251167	17632400
2016-10-01	64.910004	68.43	61.580002	63.209999	60.676903	19339200
2016-11-01	63.009998	69.449997	62.580002	68.900002	66.138885	20461100
2016-12-01	69.220001	77.290001	68.410004	73.889999	71.187592	16597800
2017-01-01	73.68	79.760002	72.540001	79.620003	76.708015	13205100
2017-02-01	79.760002	81.360001	76.75	78.050003	75.195442	36755000
2017-03-01	78.669998	81.32	77.68	81.07	78.104988	28467600
2017-04-01	81.029999	84.629997	80	82.410004	79.651115	18745300
2017-05-01	82.620003	86.889999	82.099998	86.370003	83.478546	32255300
2017-06-01	86.779999	91.800003	86.099998	91.400002	88.595772	23228000
2017-07-01	91.830002	94.699997	91.120003	94.529999	91.629723	14761300
2017-08-01	94.809998	101.349998	92.199997	100.889999	97.794594	19723600
2017-09-01	100.610001	108.260002	100.519997	107.629997	104.609291	27616100
2017-10-01	107.919998	113.379997	107.480003	113.059998	109.886887	17366800
2017-11-01	113.690002	125.040001	109.839996	116.019997	112.763824	29370800
2017-12-01	124.419998	128.320007	121.269997	124.589996	121.36425	25379100

2018-01-01	124.879997	138.539993	120.349998	134.389999	130.910522	18836800
2018-02-01	134.169998	136.940002	96.809998	112.010002	109.10997	48600700
2018-03-01	111.629997	124.559998	110.699997	114.099998	111.145866	28404200
2018-04-01	114.080002	115.129997	104.330002	106.779999	104.266708	20562900
2018-05-01	106.389999	109.550003	97.230003	97.559998	95.263733	28671700
2018-06-01	98.849998	107.669998	97.550003	104.07	101.898346	24453600
2018-07-01	103.379997	106.169998	94	97.129997	95.103172	13545000
2018-08-01	97.07	103.970001	91.099998	100.800003	98.696579	19887900
2018-09-01	100.660004	109.120003	95.57	95.959999	94.24752	16520900
2018-10-01	95.5	114.599998	93.760002	112.849998	110.83609	21477100
2018-11-01	113.669998	115.110001	104.540001	107.620003	105.699432	17033900
2018-12-01	107.720001	109.25	87.870003	97.830002	96.365334	16879100
2019-01-01	95.940002	99.470001	89.540001	93.269997	91.873604	15615000
2019-02-01	92.900002	99.43	92.150002	95.910004	94.474091	16571100
2019-03-01	96.150002	98.360001	89.529999	95.440002	94.321671	17955100
2019-04-01	95.449997	102.480003	94.029999	101.610001	100.419388	11390300
2019-05-01	101.230003	109.669998	99.809998	108.540001	107.268188	16810800
2019-06-01	108.25	112.910004	103.459999	103.629997	102.71254	14580100
2019-07-01	104.68	115.919998	104.25	109.309998	108.342262	11159900
2019-08-01	109.110001	122.879997	108.099998	119.160004	118.105057	14511300
2019-09-01	117.120003	120.349998	109.199997	114.910004	114.235504	14390700
2019-10-01	115.279999	118.449997	112.190002	115.150002	114.474091	12394100
2019-11-01	119.470001	124.879997	112.449997	118.900002	118.202087	15347000
2019-12-01	118.040001	121.849998	114.139999	120	119.643654	12736400
2020-01-01	119.699997	124.190002	114.449997	123.220001	122.854095	13107000

ICE

Date	Open	High	Low	Close	Adj Close	Volume
2014-01-01	44.832001	45.900002	40.202	41.757999	33.212936	114675500
2014-02-01	41.636002	43.966	40.580002	41.768002	33.22089	88025000
2014-03-01	41.481998	43.868	39.068001	39.566002	31.469494	101863500
2014-04-01	39.518002	41.245998	37.66	40.888	33.034317	105372000
2014-05-01	40.956001	41.400002	37.380001	39.279999	31.735167	102177000
2014-06-01	39.400002	40.599998	37.139999	37.779999	30.523302	97731000
2014-07-01	37.967999	39.841999	36.48	38.444	31.605129	106832500
2014-08-01	38.402	38.948002	37.056	37.799999	31.075693	80003500
2014-09-01	37.990002	41.026001	36.854	39.009998	32.070435	89995500
2014-10-01	39.009998	41.66	38.683998	41.658001	34.842316	99785000
2014-11-01	41.689999	45.332001	41.689999	45.198002	37.803135	73047000
2014-12-01	45.202	45.757999	42.939999	43.858002	36.682369	78656500
2015-01-01	44.077999	44.77	40.448002	41.146	34.917439	106801500
2015-02-01	41.416	48.009998	41.113998	47.071999	39.946377	64461000
2015-03-01	46.978001	47.984001	45.175999	46.653999	39.591652	73842500
2015-04-01	46.532001	47.077999	44.231998	44.905998	38.652611	53628500
2015-05-01	44.849998	48.396	44.807999	47.355999	40.761433	79860000
2015-06-01	47.498001	48.591999	44.382	44.722	38.49424	65719500
2015-07-01	45.037998	46.793999	44.318001	45.608002	39.874748	58438500
2015-08-01	45.773998	49.278	44.056	45.681999	39.939442	80648000
2015-09-01	44.911999	47.632	44.698002	46.998001	41.090015	80017500
2015-10-01	46.801998	52.535999	44.928001	50.48	44.846207	77830000
2015-11-01	50.304001	53.348	50.150002	51.967999	46.168137	53830500

2015-12-01	52.304001	53.200001	48.074001	51.251999	45.532047	106383500
2016-01-01	50.450001	52.806	48.068001	52.759998	47.603512	105212500
2016-02-01	52.658001	53.778	45.698002	47.692001	43.030838	115589500
2016-03-01	46.563999	48.074001	45.444	47.028	42.43174	92292000
2016-04-01	46.972	48.925999	45.875999	48.006001	44.108501	64866500
2016-05-01	48.105999	54.389999	47.619999	54.223999	49.821682	96797000
2016-06-01	54.223999	54.223999	48.150002	51.192001	47.035851	93463000
2016-07-01	50.984001	53.228001	50.178001	52.84	49.35508	45452000
2016-08-01	52.939999	56.650002	52.450001	56.403999	52.684021	60513000
2016-09-01	56.514	57.403999	53.416	53.872002	50.319019	62085000
2016-10-01	53.667999	54.501999	52.619999	54.077999	51.285305	54018500
2016-11-01	53.599998	58.700001	52.265999	55.400002	52.539036	72710500
2016-12-01	55.5	59.860001	55.380001	56.419998	53.506363	59483200
2017-01-01	56.900002	58.869999	55.799999	58.360001	55.663795	42764800
2017-02-01	58.419998	60.540001	56.799999	57.130001	54.490627	63118200
2017-03-01	57.830002	61.98	57.610001	59.869999	57.104042	70334400
2017-04-01	60.049999	61.549999	58.799999	60.200001	57.609558	47258800
2017-05-01	60.5	61.02	57.91	60.189999	57.599983	53873000
2017-06-01	60.650002	66.730003	60.110001	65.919998	63.083408	62830200
2017-07-01	66.07	67.480003	65.190002	66.709999	64.038116	47038800
2017-08-01	66.790001	67.309998	63.220001	64.669998	62.079823	43571200
2017-09-01	64.839996	68.879997	63.93	68.699997	65.94841	41184400
2017-10-01	68.860001	71.239998	64.910004	66.099998	63.837116	79560700
2017-11-01	66.199997	71.800003	65.279999	66.080002	63.817787	90934600
2017-12-01	71.349998	72.989998	69.300003	70.559998	68.144424	52940500

2018-01-01	70.769997	76.139999	69.559998	73.839996	71.715569	49805200
2018-02-01	74.010002	75.290001	66.919998	73.080002	70.977455	64982900
2018-03-01	73.040001	76.300003	70.290001	72.519997	70.433563	61333600
2018-04-01	72.489998	75.080002	69.800003	72.459999	70.601036	47443700
2018-05-01	72.239998	73.050003	67.699997	70.889999	69.071304	58470500
2018-06-01	71.620003	76.690002	71.599998	73.550003	71.663071	49894700
2018-07-01	73.309998	77.220001	72.209999	73.910004	72.24366	39713200
2018-08-01	74.050003	76.309998	72.059998	76.230003	74.511345	51578400
2018-09-01	76.309998	78.480003	74.660004	74.889999	73.201553	48161800
2018-10-01	75.019997	77.379997	72.110001	77.040001	75.535172	77219200
2018-11-01	77.629997	81.949997	75.650002	81.720001	80.123764	65566000
2018-12-01	82.209999	82.650002	69.690002	75.330002	73.858582	56704300
2019-01-01	74.489998	76.889999	71.199997	76.760002	75.492935	57957200
2019-02-01	77.040001	80.099998	74.010002	77.150002	75.876488	64442900
2019-03-01	77.519997	78.160004	71.900002	76.139999	74.883179	61114100
2019-04-01	76.610001	81.989998	76.489998	81.349998	80.305389	55357500
2019-05-01	81.239998	82.790001	78.870003	82.209999	81.154358	54156800
2019-06-01	82.300003	87.260002	81.940002	85.940002	84.836464	43168100
2019-07-01	86.690002	92.309998	85.709999	87.860001	87.011726	41033900
2019-08-01	87.019997	93.879997	85.790001	93.480003	92.577469	41787400
2019-09-01	93.120003	95.550003	88.989998	92.269997	91.37915	42528200
2019-10-01	92.199997	95.559998	89.940002	94.32	93.694695	48117900
2019-11-01	94.940002	95.339996	89.089996	94.169998	93.545685	49237300
2019-12-01	94.160004	94.610001	90.010002	92.550003	91.936432	55473100
2020-01-01	92.839996	100.43	91.949997	99.739998	99.380013	49619600

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Date	Open	High	Low	Close	Adj Close	Volume
2014-01-01	81.5	85.879997	78.82	79.879997	70.004311	70394800
2014-02-01	80.019997	84.75	77.419998	83.349998	73.045311	47342400
2014-03-01	82.559998	84.690002	76.25	79.720001	69.86409	69509700
2014-04-01	79.599998	80.389999	76.360001	80.220001	70.302269	71963300
2014-05-01	80.18	81.489998	77.709999	81.449997	72.238312	42588900
2014-06-01	81.099998	84.559998	79.769997	80.839996	71.697304	60237800
2014-07-01	81.089996	81.690002	78.849998	79.279999	70.313751	50873500
2014-08-01	78.849998	81.989998	76.870003	81.059998	71.892418	42921000
2014-09-01	80.949997	82.160004	77.559998	81.32	72.123024	67907500
2014-10-01	81.18	81.419998	73.980003	81.120003	71.945656	75168600
2014-11-01	81.029999	86.489998	80.669998	86.330002	77.605644	43764800
2014-12-01	85.879997	91.940002	81.660004	89.309998	80.284477	62619800
2015-01-01	89.669998	91.339996	83.860001	84.029999	75.538071	54792200
2015-02-01	84.419998	91.440002	83.470001	90.029999	80.931725	41496100
2015-03-01	90.029999	94.980003	86.400002	93.690002	84.221863	68503900
2015-04-01	93.559998	96.779999	92.129997	92.650002	83.286934	48841600
2015-05-01	93.32	97.949997	92.589996	96.040001	88.219498	39458400
2015-06-01	96.18	100.470001	94.25	96.779999	88.899239	49597500
2015-07-01	97.739998	103.989998	96.309998	103.110001	94.713791	48475700
2015-08-01	103.169998	105.370003	88.43	94.269997	86.593636	56966300
2015-09-01	91.879997	99.940002	91.68	98.260002	90.258728	60092500
2015-10-01	98.470001	109.860001	96.309998	107.199997	98.470757	55509800
2015-11-01	107.080002	108.43	103.019997	107.220001	99.547333	46891900

2015-12-01	107.290001	109.650002	101.910004	104.5	97.021957	54959900
2016-01-01	102.620003	105.650002	97.139999	105.540001	97.987549	66081200
2016-02-01	104.75	106.800003	91.400002	100.260002	93.085388	72193500
2016-03-01	101.379997	116.510002	101	115.400002	107.141953	68422700
2016-04-01	114.760002	116.519997	111.790001	112.919998	104.839424	49572000
2016-05-01	112.900002	119.720001	112.25	118.970001	111.528961	37905300
2016-06-01	118.970001	120.779999	108.660004	113.290001	106.204224	50791400
2016-07-01	113.660004	118	111.330002	112.809998	105.754242	43799800
2016-08-01	112.580002	116.199997	111.730003	115	107.807266	42291400
2016-09-01	114.75	124.959999	108.830002	122.169998	114.528801	58695000
2016-10-01	121.589996	122.470001	114.510002	116.239998	108.969711	50003000
2016-11-01	116.5	121.529999	114.660004	119.43	113.124832	54957500
2016-12-01	119.5	125.720001	116.089996	117.129997	110.946266	49415000
2017-01-01	117.379997	118.360001	112.610001	113.870003	107.858383	52904600
2017-02-01	113.800003	123.43	112.309998	122.5	116.032768	38174000
2017-03-01	123.239998	126.529999	118.300003	119.879997	113.551071	65634500
2017-04-01	118	121.349998	114.82	121.300003	114.896118	42332600
2017-05-01	121.370003	124.599998	119.410004	124.470001	119.121925	40493000
2017-06-01	124.93	128.470001	119.099998	123.68	118.365883	56432600
2017-07-01	123.82	129.699997	122.029999	128.820007	123.285034	33694900
2017-08-01	129.100006	130.919998	127.260002	130.759995	125.141655	34604900
2017-09-01	130.949997	138.699997	129.100006	135.070007	129.26651	50820700
2017-10-01	135.229996	143.779999	133.660004	142.360001	136.24324	41387500
2017-11-01	142.259995	148.600006	141.470001	148.009995	143.02243	34120000
2017-12-01	147.699997	158.440002	145.75	153.089996	147.931244	40816400

2018-01-01	153.5	162.600006	152.779999	160.699997	155.284821	42247000
2018-02-01	160.160004	165.580002	148.789993	161.009995	155.584366	43864100
2018-03-01	161.279999	164.300003	147.160004	153.5	148.327423	66273100
2018-04-01	151.820007	155.699997	146.050003	151.199997	146.104935	42164300
2018-05-01	151.089996	157.649994	149.139999	155.740005	151.819946	37186500
2018-06-01	156.940002	165.559998	155.300003	163.589996	159.472321	57789200
2018-07-01	161.899994	168.949997	158.080002	159.330002	155.31958	42665600
2018-08-01	160.309998	169.919998	157.839996	169.070007	164.814407	37640800
2018-09-01	168.759995	175.639999	167.5	170.199997	165.915955	40698200
2018-10-01	171.139999	174.820007	150.630005	157.619995	153.652603	53970000
2018-11-01	157.899994	165.940002	155.25	164.520004	161.844788	47618200
2018-12-01	165.970001	168.369995	132.630005	141.009995	138.717056	58259200
2019-01-01	138.929993	154.899994	135.580002	153.550003	151.053146	43567200
2019-02-01	154.25	162.5	153.660004	161.380005	158.755829	34127700
2019-03-01	163	177.490005	160.5	176.020004	173.157776	45264400
2019-04-01	175.5	182.830002	174.559998	182.669998	179.699646	35897100
2019-05-01	183.199997	183.350006	170.350006	178.070007	176.625366	39072700
2019-06-01	177.869995	187.309998	174.229996	184.770004	183.271011	39715600
2019-07-01	184.830002	197.470001	184.429993	192.580002	191.017654	34614000
2019-08-01	193.330002	200.679993	184.229996	198.169998	196.562302	40805700
2019-09-01	196.360001	202.800003	187.279999	192.350006	190.78952	43457400
2019-10-01	192.600006	193.369995	181.970001	185.419998	183.915741	42679200
2019-11-01	186.699997	201.660004	185.479996	201.160004	200.3853	30349000
2019-12-01	201.440002	213.25	196.470001	210.570007	209.759064	39647400
2020-01-01	210.860001	211.919998	203.190002	205.210007	204.419708	46225400

