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                        ISE 599 Midterm Report
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%%preparation of data
%%To simplify the original excel 'ISE599_Midterm.XLSX', I split the excel into
5 separate excel documents
%'allname.xlsx': record all the names of assets follow the time series
%%'rebalance return.xlsx': extract all the month end price of all assets,
preparing for the strategy monthly rebalance. And calculate the corresponding
returns between terms
%%'price.xlsx': all the prices of all assets through time series
%%'name2.xlsx': On all of the month end days,  all assets' names at those days
%%'time.xlsx','Sheet1': the dates of all month end days, 'time.xlsx','Sheet2':
the dates of all days
%% Those excels will be attached with my midterm report
[blah,ac_name]=xlsread('allname.xlsx');
rebalance_ret = xlsread('rebalance return.xlsx');
[ac_price,blah]=xlsread('price.xlsx');
[blah,name2]=xlsread('name2.xlsx');
t1 =xlsread('time.xlsx','Sheet1');
t2 =xlsread('time.xlsx','Sheet2');
t_index = [];
for c=1:229
t_index(c) = find(t2==t1(c));
end

bret = rebalance_ret;
lret =[];
sret = [];
%%%Search and rebalance the assets at every end of months by assets' names
for m =1:228
[B,index]= sort(bret(m,:),'descend');
long = name2(m,index(1)+1);
short = name2(m,index(11)+1);
ol = index(1)+1;
os = index(11)+1;
    for j = (t_index(m)+1):t_index(m+1)
          long1=~cellfun(@isempty,strfind(ac_name(j-1,:),long));
          long2=~cellfun(@isempty,strfind(ac_name(j,:),long));
          short1=~cellfun(@isempty,strfind(ac_name(j-1,:),short));
          short2=~cellfun(@isempty,strfind(ac_name(j,:),short));
           x1= find(long1);
           y1= find(short1);
           x2 =find(long2);
           y2 = find(short2);


         lret =  [lret; (ac_price(j,x2)/ac_price(j-1,x1) - 1)];
         sret = [sret; (ac_price(j,y2)/ac_price(j-1,y1) - 1)];


       end
end
 %%  daily long return
lret
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  lret =
      0.0202
     -0.0216
      0.0172
      0.0254
     -0.0122
     -0.0146
```

```
      0.0247
      0.0187
      0.0046
      0.0303
```

```
%% daily short return
sret
```

```
   sret =
      0.0142
     -0.0131
      0.0174
      0.0207
     -0.0203
     -0.0059
      0.0118
      0.0081
      0.0009
      0.0222
```

```
%% daily strategy portfolio return
pret =lret-sret
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```
   pret =
      0.0060
     -0.0085
     -0.0002
      0.0047
      0.0081
     -0.0087
      0.0130
      0.0107
      0.0037
      0.0081
```

```
%% the portflio return used for daily compounding
c_pret= pret+1
```

```
   c_pret =
      1.0060
      0.9915
      0.9998
      1.0047
      1.0081
      0.9913
      1.0130
      1.0107
      1.0037
      1.0081
```

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%%%%%%%%%%%%%%%%%%%%%%%----------------------
-%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%Goal#1    Assume we invest $1 in the strategy from day 1, i.e.,
1/31/2000, please plot the value of our investment over time.
% value of $1 for daily compounding
value=[]
```

```
value =

    []
```

```
org_value =1
```

```
org_value = 1
```

```
temp=[1;c_pret]
```

```
temp =
    1.0000
    1.0060
    0.9915
    0.9998
    1.0047
    1.0081
    0.9913
    1.0130
    1.0107
    1.0037
```

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n=length(temp)
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n = 4959
```

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for i =1:n
value = [value; prod(temp(1:i))];
end
%% Plot the daily value of our investment
date= datetime(t2,'ConvertFrom','datenum')+calyears(1900);
figure
plot(date,value)
title('daily value of strategy time-series')
```


```
%% Goal #2 Calculate the strategy's calendar year returns, i.e.,
cumulative returns in each year from 2000 to 2019.
%% Compounding all of the daily returns in every calendar year to get the
calendar year returns

  yr_ret=[];
  yr_date =[2000:2018]';
  for i =0:18
      yr_ret=[yr_ret;prod(c_pret((t_index(1+12*i):(t_index(1+12*(i+1)))-1)))-1];
  end

%%Print out calendar year return
  array2table([yr_date,yr_ret],'VariableNames',...
    {'Year','Calendar_Year_Return'})
ans = 19×2 table
    Year    Calendar_Year_Return
    ____    ____________________

    2000      -0.23173
    2001       0.10446
    2002     -0.037113
    2003      0.089882
    2004      0.087229
    2005       0.29018
    2006       0.27557
    2007     -0.019804
    2008        0.2485
    2009     -0.040789
    2010      0.090535
    2011      0.085067
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    2012       0.04352
    2013      0.015563
    2014      -0.07856
    2015       0.13075
    2016      0.012778
    2017     -0.022205
    2018    -0.0035489
```

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%% Plot Calendar year returns of our strategy
figure
plot(yr_date, yr_ret)
grid
title('Calendar year returns of our strategy time-series')
```

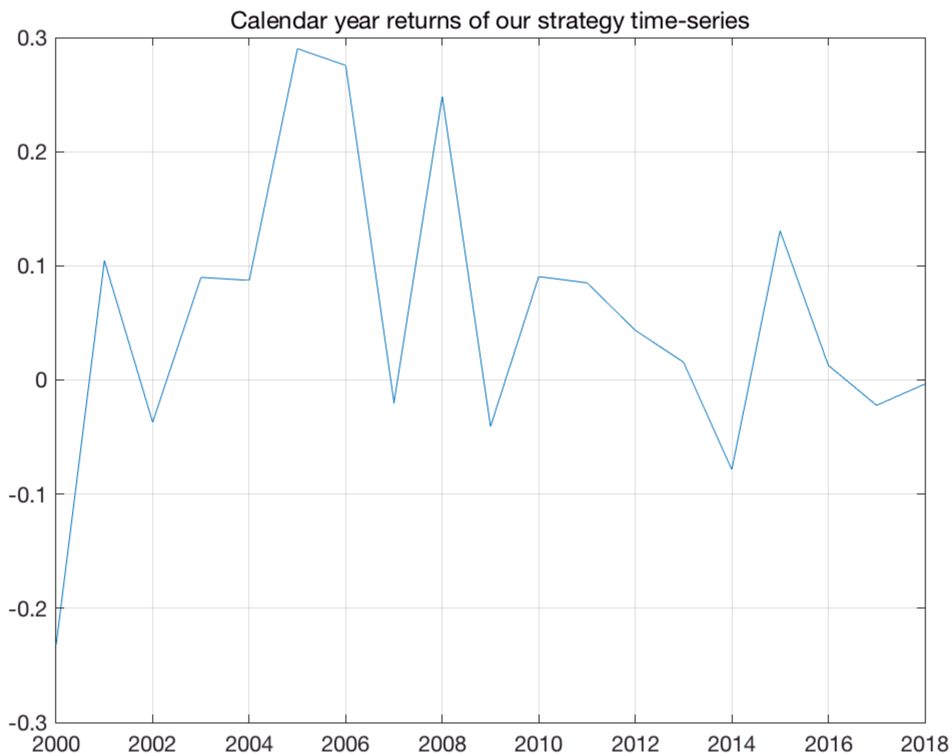


```
%%Goal#3 Calculate the annualized return, annualized risk, and Sharpe ratio
(let's assume risk-free rate of 0) of the strategy.

%calculate the annualized return(assume the annualized return is the geometric
mean of the daily compounding returns to compounding 252 days for one year and
then minus 1)
anual_ret=(geomean(1+pret))^252-1
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anual_ret = 0.0458
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%calculate the annula volatility of the strategy, there is two ways to
calculate it, one is std( calender year return), which is too rough.
%So I choose the second method: std(daily return)* sqrt(252)
anual_risk = std(pret)*sqrt(252)
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anual_risk = 0.1131
```

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% the sharpe ratio: since the risk-free rate equals 0, the sharpe raio =
(anual_ret-0)/anual_risk
s_ratio=anual_ret/anual_risk
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s_ratio = 0.4046
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%%Goal #4 Identify the maximum drawdown period for this strategy.
%   we need first calculate the drawdown time series

drawdown_ts=nan(size(value));
for t=1:length(value)

    %   the high-watermark before the date
    tmp_max=max(value(1:t));

    %   skip if it's nan
    if isnan(tmp_max)
        continue;
    end

    %   drawdown from high-watermark to the current price
    drawdown_ts(t)=value(t)/tmp_max*100-100;

end

%   plot the drawdown time series
figure
plot(date,drawdown_ts);
ylim([-50 10]);
title('Investment Strategy Drawdown Time Series (%)')
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%  let's locate the max-drawdown period
[maxdd,t_end]=min(drawdown_ts);
[blah,t_start]=max(value(1:t_end));
fprintf('MaxDD of %.2f%% starts at %s, ends
at %s.\n',maxdd,date(t_start),date(t_end));
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MaxDD of -35.29% starts at 03/08/2000, ends at 12/22/2000.
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