```
clear
%% Import data
FamaFrench4 = readtable('FamaFrench4.xlsx');
FamaFrench5 = readtable('FamaFrench5.xlsx');
Virtueportfolio = readtable('Virtue_portfolio_returns.xlsx');
Sinportfolio = readtable('Sin_portfolio_returns.xlsx');

%% Calculating excess return
ReturnV = Virtueportfolio(1:120,2);
RF = FamaFrench4(1:120,5);
RF1 = table2array(RF);
ReturnV1 = table2array(ReturnV);
ExcessReturnVirtue = (ReturnV1 - RF1);
ReturnS = Sinportfolio(1:120,2);
ReturnS1 = table2array(ReturnS);
ExcessReturnSin = (ReturnS1 - RF1);

%% FFC and FF5 Regression EW Virtue
FamaFrench4.ExcessVirtue = ExcessReturnVirtue;
FamaFrench5.ExcessVirtue = ExcessReturnVirtue;
FamaFrench4.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','ExcessVirtue'};
FamaFrench5.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','RF','ExcessVirtue'};
RegFF4Virtue = fitlm(FamaFrench4, 'ExcessVirtue ~ Mkt_RF + SMB + HML + MOM');
RegFF5Virtue = fitlm(FamaFrench5, 'ExcessVirtue ~ Mkt_RF + SMB + HML + RMW +
CMA');

%% FFC and FF5 regression EW Sin
FamaFrench4.ExcessSin = ExcessReturnSin;
FamaFrench5.ExcessSin = ExcessReturnSin;
FamaFrench4.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','ExcessVirtue','ExcessSin'};
FamaFrench5.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','RF','ExcessVirtue','ExcessSin'};
RegFF4Sin = fitlm(FamaFrench4, 'ExcessSin ~ Mkt_RF + SMB + HML + MOM')
RegFF5Sin = fitlm(FamaFrench5, 'ExcessSin ~ Mkt_RF + SMB + HML + RMW + CMA')

%% FFC and FF5 EW SinHK
SinHKportfolio = readtable('SinHK_portfolio_returns.xlsx');
ReturnSinHK = SinHKportfolio(1:120,2);
ReturnSinHK1 = table2array(ReturnSinHK);
ExcessReturnSinHK = (ReturnSinHK1 - RF1);
FamaFrench4.SinHK = ExcessReturnSinHK;
FamaFrench5.SinHK = ExcessReturnSinHK;
FamaFrench4.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','ExcessVirtue','ExcessSin','ExcessVirt
ueVW','ExcessSinVW','VmS','SinHK'};
FamaFrench5.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','RF','ExcessVirtue','ExcessSin','Exce
ssVirtueVW','ExcessSinVW','VmS','SinHK'};
RegFF4SinHK = fitlm(FamaFrench4, 'SinHK ~ Mkt_RF + SMB + HML + MOM');
RegFF5SinHK = fitlm(FamaFrench5, 'SinHK ~ Mkt_RF + SMB + HML + RMW + CMA');

%% FFC and FF5 regression EW Long-Short
VmS = (ExcessReturnVirtue - ExcessReturnSin);
FamaFrench4.VmS = VmS;
```

```
FamaFrench5.VmS = VmS;
FamaFrench4.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','ExcessVirtue','ExcessSin','ExcessVirt
ueVW','ExcessSinVW','VmS'};
FamaFrench5.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','RF','ExcessVirtue','ExcessSin','Exce
ssVirtueVW','ExcessSinVW','VmS'};
RegFF4VmS = fitlm(FamaFrench4, 'VmS ~ Mkt_RF + SMB + HML + MOM');
RegFF5VmS = fitlm(FamaFrench5, 'VmS ~ Mkt_RF + SMB + HML + RMW + CMA');

%% Display
disp(RegFF4Virtue)
disp(RegFF5Virtue)
disp(RegFF4Sin)
disp(RegFF5Sin)
disp(RegFF4VmS)
disp(RegFF5VmS)
disp(RegFF4SinHK)
disp(RegFF5SinHK)

%% Excess return S&P
ReturnS_P500 = Virtueportfolio(1:120,5);
ReturnS_P500a = table2array(ReturnS_P500);
ExcessReturnS_P500 = (ReturnS_P500a - RF1);

%% FFC and FF5 Regression VW Virtue
ReturnVW = Virtueportfolio(1:120,7);
ReturnVW1 = table2array(ReturnVW);
ExcessReturnVirtueVW = (ReturnVW1 - RF1);
FamaFrench4.ExcessVirtueVW = ExcessReturnVirtueVW;
FamaFrench4.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','ExcessVirtue','ExcessSin','ExcessVirt
ueVW'};
FamaFrench5.ExcessVirtueVW = ExcessReturnVirtueVW;
FamaFrench5.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','RF','ExcessVirtue','ExcessSin','Exce
ssVirtueVW'};
RegFF4VirtueVW = fitlm(FamaFrench4, 'ExcessVirtueVW ~ Mkt_RF + SMB + HML +
MOM');
RegFF5VirtueVW = fitlm(FamaFrench5, 'ExcessVirtueVW ~ Mkt_RF + SMB + HML + RMW
+ CMA');

%% FFC and FF5 Regression VW Sin
ReturnSVW = Sinportfolio(1:120,6);
ReturnSVW1 = table2array(ReturnSVW);
ExcessReturnSinVW = (ReturnSVW1 - RF1);
FamaFrench4.ExcessSinVW = ExcessReturnSinVW;
FamaFrench4.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','ExcessVirtue','ExcessSin','ExcessVirt
ueVW','ExcessSinVW'};
RegFF4SinVW = fitlm(FamaFrench4, 'ExcessSinVW ~ Mkt_RF + SMB + HML + MOM');
FamaFrench5.ExcessSinVW = ExcessReturnSinVW;
FamaFrench5.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','RF','ExcessVirtue','ExcessSin','Exce
ssVirtueVW','ExcessSinVW'};
RegFF5SinVW = fitlm(FamaFrench5, 'ExcessSinVW ~ Mkt_RF + SMB + HML + RMW +
CMA');
```

```
%% FFC and FF5 Regression VW VmS
VmSVW = (ExcessReturnVirtueVW - ExcessReturnSinVW);
FamaFrench4.VmSVW = VmSVW;
FamaFrench5.VmSVW = VmSVW;
FamaFrench4.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','ExcessVirtue','ExcessSin','ExcessVirt
ueVW','ExcessSinVW','VmS','SinHK','VmSVW'};
FamaFrench5.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','RF','ExcessVirtue','ExcessSin','Exce
ssVirtueVW','ExcessSinVW','VmS','SinHK','VmSVW'};
RegFF4VmSVW = fitlm(FamaFrench4, 'VmSVW ~ Mkt_RF + SMB + HML + MOM');
RegFF5VmSVW = fitlm(FamaFrench5, 'VmSVW ~ Mkt_RF + SMB + HML + RMW + CMA');

%% FFC and FF5 Regression VW SinHK
ReturnSinHKVW = SinHKportfolio(1:120,4);
ReturnSinHKVW1 = table2array(ReturnSinHKVW);
ExcessReturnSinHKVW = (ReturnSinHKVW1 - RF1);
FamaFrench4.SinHKVW = ExcessReturnSinHKVW;
FamaFrench5.SinHKVW = ExcessReturnSinHKVW;
FamaFrench4.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','ExcessVirtue','ExcessSin','ExcessVirt
ueVW','ExcessSinVW','VmS','SinHK','VmSVW','SinHKVW'};
FamaFrench5.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','RF','ExcessVirtue','ExcessSin','Exce
ssVirtueVW','ExcessSinVW','VmS','SinHK','VmSVW','SinHKVW'};
RegFF4SinHKVW = fitlm(FamaFrench4, 'SinHKVW ~ Mkt_RF + SMB + HML + MOM');
RegFF5SinHKVW = fitlm(FamaFrench5, 'SinHKVW ~ Mkt_RF + SMB + HML + RMW +
CMA');

%% Disp VW
disp(RegFF4VirtueVW)
disp(RegFF5VirtueVW)
disp(RegFF4SinVW)
disp(RegFF5SinVW)
disp(RegFF4VmSVW)
disp(RegFF5VmSVW)
disp(RegFF4SinHKVW)
disp(RegFF5SinHKVW)

%% Sub-sample regression
V1 = ExcessReturnVirtue(1:40);
V2 = ExcessReturnVirtue(41:80);
V3 = ExcessReturnVirtue(81:120);
S1 = ExcessReturnSin(1:40);
S2 = ExcessReturnSin(41:80);
S3 = ExcessReturnSinHK(81:120);
HK1 = ExcessReturnSinHK(1:40);
HK2 = ExcessReturnSinHK(41:80);
HK3 = ExcessReturnSinHK(81:120);
VmS1 = VmS(1:40);
VmS2 = VmS(41:80);
VmS3 = VmS(81:120);

%%
FamaFrench4_1 = FamaFrench4(1:40,1:6);
FamaFrench4_2 = FamaFrench4(41:80,1:6);
```

```
FamaFrench4_3 = FamaFrench4(81:120,1:6);
FamaFrench5_1 = FamaFrench5(1:40,1:6);
FamaFrench5_2 = FamaFrench5(41:80,1:6);
FamaFrench5_3 = FamaFrench5(81:120,1:6);

%%  Insert varable in table
FamaFrench4_1.V1 = V1;
FamaFrench4_2.V2 = V2;
FamaFrench4_3.V3 = V3;
FamaFrench4_1.S1 = S1;
FamaFrench4_2.S2 = S2;
FamaFrench4_3.S3 = S3;
FamaFrench4_1.HK1 = HK1;
FamaFrench4_2.HK2 = HK2;
FamaFrench4_3.HK3 = HK3;
FamaFrench4_1.VmS1 = VmS1;
FamaFrench4_2.VmS2 = VmS2;
FamaFrench4_3.VmS3 = VmS3;

%% Renaming of Variables
FamaFrench4_1.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','V1','S1','HK1','VmS1'};
FamaFrench4_2.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','V2','S2','HK2','VmS2'};
FamaFrench4_3.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RF','MOM','V3','S3','HK3','VmS3'};

%% Insert variable in table
FamaFrench5_1.V1 = V1;
FamaFrench5_2.V2 = V2;
FamaFrench5_3.V3 = V3;
FamaFrench5_1.S1 = S1;
FamaFrench5_2.S2 = S2;
FamaFrench5_3.S3 = S3;
FamaFrench5_1.HK1 = HK1;
FamaFrench5_2.HK2 = HK2;
FamaFrench5_3.HK3 = HK3;
FamaFrench5_1.VmS1 = VmS1;
FamaFrench5_2.VmS2 = VmS2;
FamaFrench5_3.VmS3 = VmS3;

%% Renaming of Variable
FamaFrench5_1.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','V1','S1','HK1','VmS1'};
FamaFrench5_2.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','V2','S2','HK2','VmS2'};
FamaFrench5_3.Properties.VariableNames =
{'Date','Mkt_RF','SMB','HML','RMW','CMA','V3','S3','HK3','VmS3'};

%% FFC sub sample regression
RegFF4V1 = fitlm(FamaFrench4_1, 'V1 ~ Mkt_RF + SMB + HML + MOM');
RegFF4V2 = fitlm(FamaFrench4_2, 'V2 ~ Mkt_RF + SMB + HML + MOM');
RegFF4V3 = fitlm(FamaFrench4_3, 'V3 ~ Mkt_RF + SMB + HML + MOM');
RegFF4S1 = fitlm(FamaFrench4_1, 'S1 ~ Mkt_RF + SMB + HML + MOM');
RegFF4S2 = fitlm(FamaFrench4_2, 'S2 ~ Mkt_RF + SMB + HML + MOM');
RegFF4S3 = fitlm(FamaFrench4_3, 'S3 ~ Mkt_RF + SMB + HML + MOM');
RegFF4HK1 = fitlm(FamaFrench4_1, 'HK1 ~ Mkt_RF + SMB + HML + MOM');
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```
RegFF4HK2 = fitlm(FamaFrench4_2, 'HK2 ~ Mkt_RF + SMB + HML + MOM');
RegFF4HK3 = fitlm(FamaFrench4_3, 'HK3 ~ Mkt_RF + SMB + HML + MOM');
RegFF4VmS1 = fitlm(FamaFrench4_1, 'VmS1 ~ Mkt_RF + SMB + HML + MOM');
RegFF4VmS2 = fitlm(FamaFrench4_2, 'VmS2 ~ Mkt_RF + SMB + HML + MOM');
RegFF4VmS3 = fitlm(FamaFrench4_3, 'VmS3 ~ Mkt_RF + SMB + HML + MOM');

%% FF5 sub sample regression
RegFF5V1 = fitlm(FamaFrench5_1, 'V1 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5V2 = fitlm(FamaFrench5_2, 'V2 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5V3 = fitlm(FamaFrench5_3, 'V3 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5S1 = fitlm(FamaFrench5_1, 'S1 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5S2 = fitlm(FamaFrench5_2, 'S2 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5S3 = fitlm(FamaFrench5_3, 'S3 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5HK1 = fitlm(FamaFrench5_1, 'HK1 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5HK2 = fitlm(FamaFrench5_2, 'HK2 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5HK3 = fitlm(FamaFrench5_3, 'HK3 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5VmS1 = fitlm(FamaFrench5_1, 'VmS1 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5VmS2 = fitlm(FamaFrench5_2, 'VmS2 ~ Mkt_RF + SMB + HML + RMW + CMA');
RegFF5VmS3 = fitlm(FamaFrench5_3, 'VmS3 ~ Mkt_RF + SMB + HML + RMW + CMA');

%% Display FFC
disp(RegFF4V1)
disp(RegFF4V2)
disp(RegFF4V3)
disp(RegFF4S1)
disp(RegFF4S2)
disp(RegFF4S3)
disp(RegFF4HK1)
disp(RegFF4HK2)
disp(RegFF4HK3)
disp(RegFF4VmS1)
disp(RegFF4VmS2)
disp(RegFF4VmS3)

%% Display FF5
disp(RegFF5V1)
disp(RegFF5V2)
disp(RegFF5V3)
disp(RegFF5S1)
disp(RegFF5S2)
disp(RegFF5S3)
disp(RegFF5HK1)
disp(RegFF5HK2)
disp(RegFF5HK3)
disp(RegFF5VmS1)
disp(RegFF5VmS2)
disp(RegFF5VmS3)

%% Skewness & Kurtosis
SkV = skewness(ExcessReturnVirtue)
SkS = skewness(ExcessReturnSin)
SkS_P = skewness(ExcessReturnS_P500)

KV = kurtosis(ExcessReturnVirtue)
KS = kurtosis(ExcessReturnSin)
KS_P = kurtosis(ExcessReturnS_P500)
```

```
%% ESG & Size
clear
ESGSize = readtable('ESGMarketCap2019.xlsx');

ESG19 = ESGSize(1:472,3);
Size19 = ESGSize(1:472,5);

ESG2019 = table2array(ESG19);
Size2019 = table2array(Size19);

%%
scatter(ESG2019,Size2019)
a = polyfit(ESG2019,Size2019,1);
f = polyval(a,ESG2019);
plot(ESG2019,Size2019,'o',ESG2019,f,'-')
legend('data','linear fit')
xlabel('ESGscore')
ylabel('MaketCap')
title('Line Plot of ESG and Size')

%% without outliers

ESGSize2019a = ESGSize;
ESGSize2019a([48,28,300],:) = [];

ESG19a = ESGSize2019a(1:469,3);
Size19a = ESGSize2019a(1:469,5);
ESG2019a = table2array(ESG19a);
Size2019a = table2array(Size19a);

scatter(ESG2019a,Size2019a)
b = polyfit(ESG2019a,Size2019a,1);
d = polyval(b,ESG2019a);
plot(ESG2019a,Size2019a,'o',ESG2019a,d,'-')
legend('data','linear fit')
xlabel('ESGscore')
ylabel('MaketCap')
title('Line Plot of ESG and Size Without Outliers')
```