

## Comparison of R Squared and Cointegration Test

```
clear;  
clc;
```

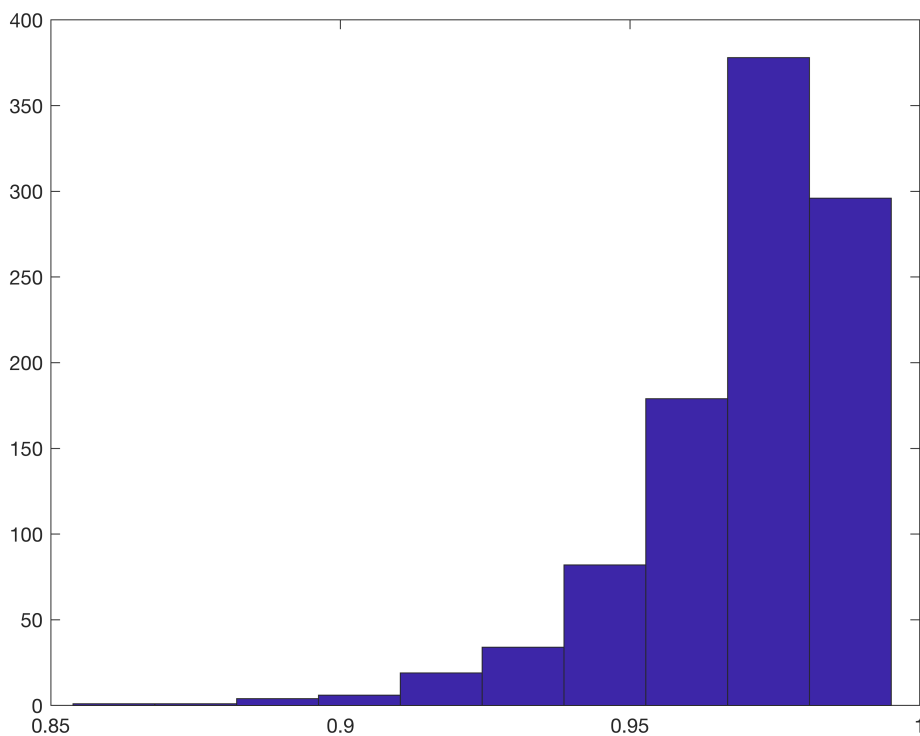
In a loop, we generate 1000 pair of random series from the normal distribution and calculate the cumulative sum of their square.

Then we compute the R squared and test for cointegration using johansen test. Results are saved on two different matrices.

```
ittr_num = 1000;  
r2_matrix = zeros(1, ittr_num);  
is_cointegrated = zeros(1, ittr_num);  
for i=1:ittr_num  
  
    % Generate series  
    x = randn(100, 1);  
    x2 = cumsum(x.^2);  
    y = randn(100, 1);  
    y2 = cumsum(y.^2);  
  
    % Calculating Ordinary R squared  
    mdl = fitlm(x2, y2);  
    r2 = mdl.Rsquared.Ordinary;  
    r2_matrix(1, i) = r2;  
  
    % Testing for cointegration  
    [H,pvalue,~,~,mles]=jcitest([x2, y2], 'lags',1, 'model', 'H1', 'Display', 'off');  
    if H{1,1}==1  
        is_cointegrated(1, i) = 1;  
    end  
end
```

Plotting the histogram of r2\_matrix shows that all values are higher than 85% and the average is above 98%. One could wrongly deduce that two i.i.d series can be used to predict each other or even there is a causality relationship between them; But the cointegration test will reject any relationship between these 1000 pair of series.

```
hist(r2_matrix)
```



Just 59 out of 1000 pair of generated series could pass the cointegration test which indicates that the results obtained from R squared are not reliable for deducting relationship between the two series and other considerations and further investigation should apply while using R squared.

```
sum(is_cointegrated)
```

```
ans = 59
```