Indicator of the financial cycle in the US

I download the GDP and proxy variable of credit, in the website of the federal reserve of saint-louis.

Contents

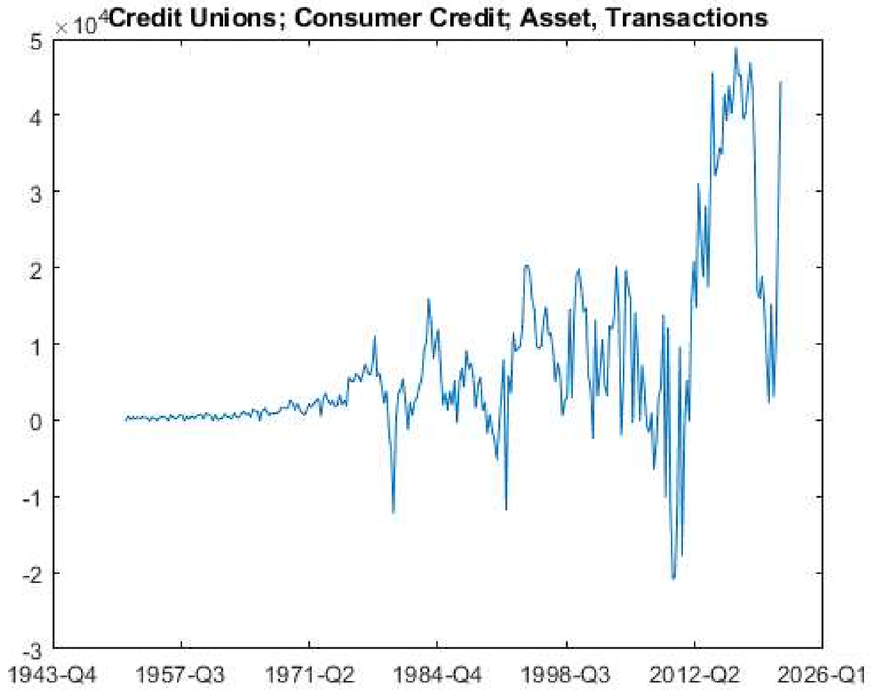
Download of the variable of interest

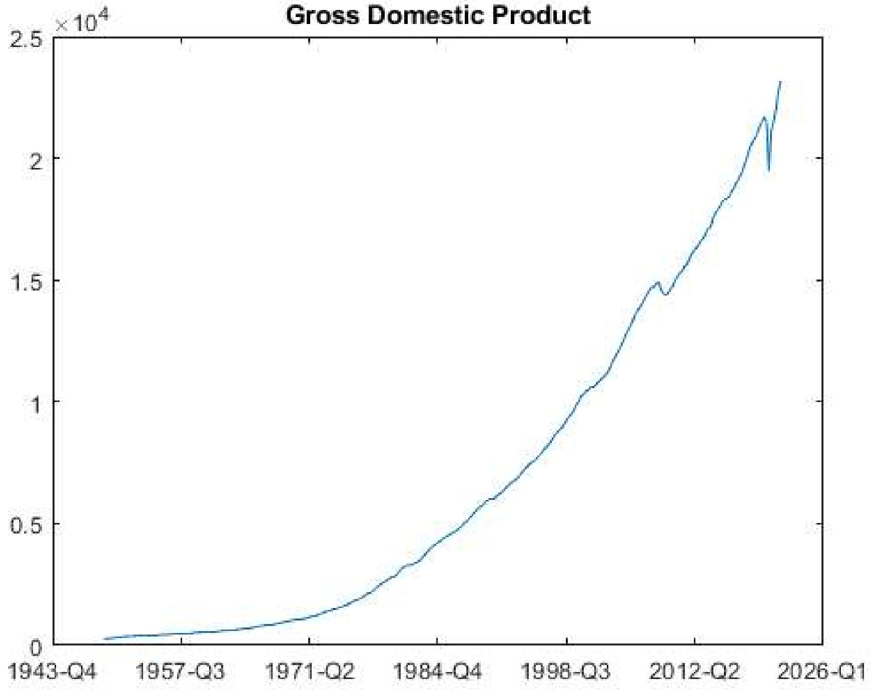
```
ticker = 'BOGZ1FA473066000Q';
url = sprintf(['https://research.stlouisfed.org/fred2/series/%s','/downloaddata/%s.csv'], ticker, ticker);
str = urlread(url);
pos    = strfind(str,[char(13),char(10)]);  % ignore first line
format = ['%s','%f'];
cells  = textscan(str(pos(1)+2:end), format,'delimiter',',', 'treatAsEmpty',{'.'}, 'CollectOutput',1);
fred.ticker = ticker;
fred.dates  = datenum(cells{1},'yyyy-mm');
fred.data   = cells{2};

credit = fred.data(12:end,1);
datecredit = fred.dates(12:end,1);

clear fred ticker url str pos format cells
```

```
ticker = 'GDP';
url = sprintf(['https://research.stlouisfed.org/fred2/series/%s','/downloaddata/%s.csv'], ticker, ticker);
str = urlread(url);
pos    = strfind(str,[char(13),char(10)]);  % ignore first line
format = ['%s','%f'];
cells  = textscan(str(pos(1)+2:end), format,'delimiter',',', 'treatAsEmpty',{'.'}, 'CollectOutput',1);
fred.ticker = ticker;
fred.dates  = datenum(cells{1},'yyyy-mm');
fred.data   = cells{2};

gdp = fred.data(11:end,1); %
dategdp = fred.dates(11:end,1); %

clear fred  ticker url str pos format cells
```

PLot of the variable

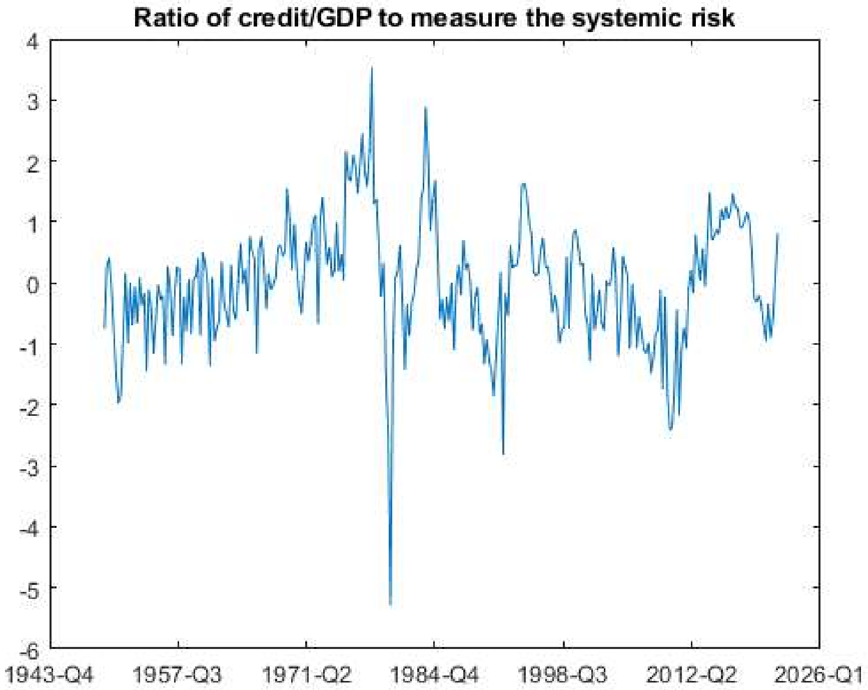
```
figure,plot(datecredit,credit)
title('Credit Unions; Consumer Credit; Asset, Transactions')
datetick('x','yyyy-qq','keepticks')

figure,plot(dategdp,gdp)
title('Gross Domestic Product')
datetick('x','yyyy-qq','keepticks')
```





Computation of the index

```
indexCGDP=credit./gdp;
options.method=2;
options.k=2;
indexCGDP=remNaNs(indexCGDP,options);

figure,plot(dategdp(2:end,1),standardize(indexCGDP))
title('Ratio of credit/GDP to measure the systemic risk')
datetick('x','yyyy-qq','keepticks')
```

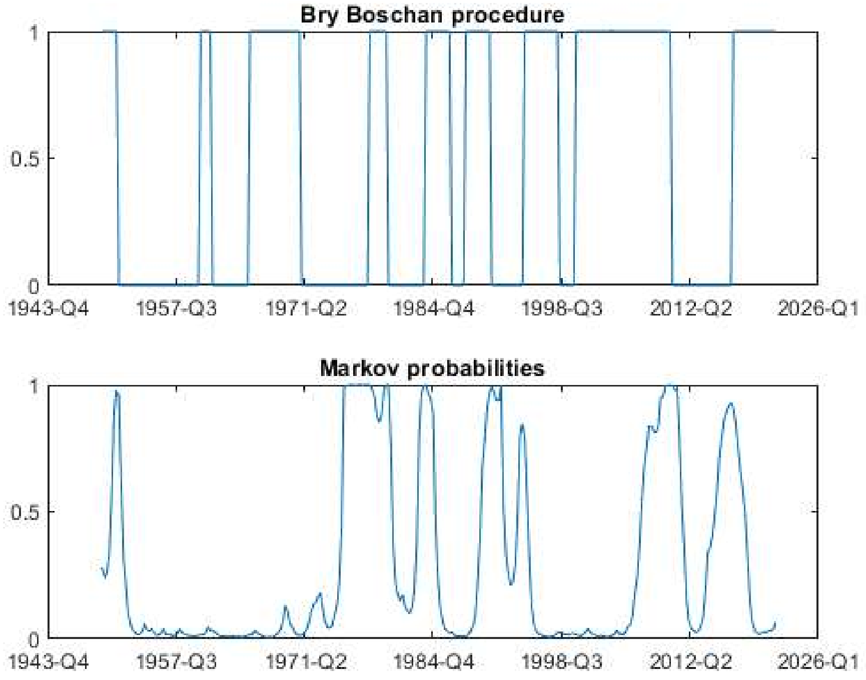


Dating procedure

```
[nber] = bryboschan_me(indexCGDP,1); %bry boschan procedure for quaterly data

% Markov univariate model
dep=standardize(indexCGDP);
[n,~]=size(dep);
nLag=0; % Number of vector autoregressive lags in 2x1 system
k=2; % Number of states/regimes (?)
doIntercept=1; % Add intercept to equations (1= Yes; 0= No) (whether ? is MS)
advOpt.distrib='Normal'; % The Distribution assumption (only ’Normal’ is allowed for MSVAR)
advOpt.std_method = 1; % Defining the method for calculation of standard errors.
advOpt.diagCovMat = 1; % Whether we will estimate by MLE also MS covariances (?feature)
advOpt.doPlots = 0; % Does not produce automatic plots (you are in charge of that!)
advOpt.printIter = 0; % When set to 0, does not print iterations to the screeen
[Spec ]=MS_VAR_Fit(dep,nLag,k,doIntercept,advOpt); % For more details see in the website of Marcelo Perlin

figure,subplot(211)
plot(dategdp(2:end,1),nber)
title('Bry Boschan procedure')
datetick('x','yyyy-qq','keepticks')
subplot(212)
plot(dategdp(2:end,1),Spec.smoothProb(:,2))
title('Markov probabilities')
datetick('x','yyyy-qq','keepticks')
```

```
Calculating Standard Error Vector...


***** Numerical Optimization Converged *****

Final log Likelihood: -376.1862
Number of estimated parameters: 6
Number of Observations: 288
Number of Equations: 1
Optimizer: fminsearch
Number of Equations in System: 1
Distribution Assumption -> Normal
Standard error calculation -> 1

***** Final Parameters for Equation #1 *****
```

```
     Intercept - Parameter Value (Standard Error, p value)
          State 1, Intercept = 0.00 (0.01,1.00)
          State 2, Intercept = -0.00 (0.00,1.00)
     Dependent Variable #1 - Parameter Value (Standard Error, p value)

---> Transition Probabilities Matrix (p-value) <---

      0.96 (0.00)   0.10 (0.00)
      0.04 ( NaN)   0.90 ( NaN)

---> Expected Duration of Regimes <---

     Expected duration of Regime #1: 23.74 time periods
     Expected duration of Regime #2: 9.65 time periods

---> Covariance Matrix <---

State 1
      0.40014 (0.05811,0.00)
State 2
      2.43559 (0.47555,0.00)
```



Computation of the quadratic probability score

```
Thresh=0.3; % Treshold probability for wich a reession of the financial cycle is detected
Hmax=4; % Lead lag month where the turning is predicted
Prob=Spec.smoothProb(:,2); % estimated Markov probability
Dat=nber; % Refernce dating probability based on bry-boscahn procedure
[nbTP,TPIndex,nb_t] = TPI(Dat,Prob,Thresh,Hmax); % For more explanation see Marie BESSEC and Ottman Bouabdallah (2015)
QPS = (1/(size(Spec.smoothProb(:,2),1)))*sum((Spec.smoothProb(:,2)-nber).^2);
disp('_____________________________________________________________________________');
disp([' QPS: '                                               num2str(QPS)]);
disp([' nb of turning points: '                              num2str(nbTP)]);
disp([' ratio nb of estimated TP / nb of observed TP: '      num2str(TPIndex)]);
disp([' % of accurate TP detected with a delay of +/-Hmax: ' num2str(nb_t)]);
```

```
_____________________________________________________________________________
 QPS: 0.4262
 nb of turning points: 16
```

```
ratio nb of estimated TP / nb of observed TP: 87.5
% of accurate TP detected with a delay of +/-Hmax: 0.25
```

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