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%-----
% JMCB "growth and public debt: what are the relevant tradeoffs?"
% CHERON - NISHIMURA - NOURRY - SEEGMULLER - VENDITTI
%-----

%-----
% DATA 1990 - 2015
%-----
%----- DATA DEBT -----
% General government debt, total (% of GDP), OECD Data
debt_Denmark = [57.69 58.84 63.84 66.99 66.13 68.72 69.23 65
60.28 56.76 52.35 48.51 49.08 46.15 44.18 37.4 31.54
27.34 33.39 40.37 42.88 46.41 45.19 44.65 44.77 45.53];
debt_France = [35.41 36.3 40.01 46.3 49.61 55.81 59.68 61.1
61.04 60.22 58.65 58.16 60.08 64.21 65.74 67.21
64.45 64.4 68.06 79 81.7 85.21 89.58 92.4 95.34
96.14];
debt_Germany = [42.25 38.89 41.52 45.12 47.42 54.82 57.6
58.77 59.38 59.96 58.76 57.58 59.22 62.92 64.69 66.91
66.33 63.54 64.93 72.43 81 78.31 79.52 77.06 74.48
70.99];
debt_Greece = [73.15 74.68 79.97 100.29 98.3 98.99 101.34
99.45 97.42 98.91 104.93 107.08 104.86 101.46 102.87 107.39
103.57 103.1 109.42 126.74 146.25 172.1 159.56 177.68 180.06
176.94];
debt_Italy = [95.22 98.59 105.49 115.66 117.87 108.69 117.71
113.43 110.81 109.66 105.11 104.73 101.92 100.48 100.09 101.94
102.56 99.78 102.39 112.52 115.38 116.5 123.34 129 132.53
132.71];
debt_Japan = [67.04 66.49 71.22 77.27 86.22 95.07 102.29
109.1 121.63 135.61 143.78 153.63 163.99 169.57 180.66 186.44
186 183.01 191.81 210.25 215.82 231.63 238.01 244.48 249.11
247.98];
debt_Portugal= [53.32 55.69 50.02 54.63 57.39 59.1 58.21
54.34 50.27 49.43 48.36 51.07 53.68 55.7 57.46 62.53
61.62 68.44 71.67 83.61 96.18 111.39 126.21 129 130.17
128.98];
debt_Spain = [41.46 42.02 44.3 54.77 57.23 61.82 65.86
64.57 62.62 60.91 57.96 54.16 51.27 47.64 45.26 42.28
38.91 35.51 39.4 52.7 60.07 69.46 85.41 93.67 99.29
99.26];
debt_UK = [28.82 28.8 33.66 38.53 41.42 44.45 44.55
43.87 41.64 39.55 36.98 34.3 34.23 35.76 38.66 40.01
41.02 42.21 50.27 64.2 75.74 81.32 84.82 86 87.94
88.98];
debt_US = [61.99 66.37 68.61 70.19 69.39 68.8 68.03
65.62 62.47 58.88 53.03 53.02 55.38 58.52 65.49 64.89
63.64 64.01 72.85 86.03 94.73 98.99 102.5 104.62 104.61
105.15];

for i = 1:26;
    date(i) = 1989+i;
end

subplot(221),plot(date,debt_Denmark,'-.',date,debt_France,'-',date,
    debt_Germany,':',date,debt_Greece,'--',date,debt_Italy,'-s')
legend('Denmark','France','Germany','Greece','Italy')
axis([1990 2015 0 250])
xlabel('YEARS')
ylabel('DEBT TO GDP RATIO')

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subplot(223),plot(date,debt_Japan,'-.',date,debt_Portugal,'-',date,
    debt_Spain,':',date,debt_UK,'--',date,debt_US,'-s')
legend('Japan','Portugal','Spain','UK','US')
axis([1990 2015 0 250])
xlabel('YEARS')
ylabel('DEBT TO GDP RATIO')

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pause
close

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```
% Average debts
```

```

av_debt_Denmark = mean(debt_Denmark);
av_debt_France  = mean(debt_France);
av_debt_Germany = mean(debt_Germany);
av_debt_Greece  = mean(debt_Greece);
av_debt_Italy   = mean(debt_Italy);
av_debt_Japan   = mean(debt_Japan);
av_debt_Portugal= mean(debt_Portugal);
av_debt_Spain   = mean(debt_Spain);
av_debt_UK      = mean(debt_UK);
av_debt_US      = mean(debt_US);

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```
nblong = length(debt_Denmark);
```

```
% Average debts by subperiods
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```

av_debt_Denmark_1 = mean(debt_Denmark(1:nblong-8));
av_debt_France_1  = mean(debt_France(1:nblong-8));
av_debt_Germany_1 = mean(debt_Germany(1:nblong-8));
av_debt_Greece_1  = mean(debt_Greece(1:nblong-8));
av_debt_Italy_1   = mean(debt_Italy(1:nblong-8));
av_debt_Japan_1   = mean(debt_Japan(1:nblong-8));
av_debt_Portugal_1= mean(debt_Portugal(1:nblong-8));
av_debt_Spain_1   = mean(debt_Spain(1:nblong-8));
av_debt_UK_1      = mean(debt_UK(1:nblong-8));
av_debt_US_1      = mean(debt_US(1:nblong-8));

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```

av_debt_Denmark_2 = mean(debt_Denmark(nblong-7:nblong));
av_debt_France_2  = mean(debt_France(nblong-7:nblong));
av_debt_Germany_2 = mean(debt_Germany(nblong-7:nblong));
av_debt_Greece_2  = mean(debt_Greece(nblong-7:nblong));
av_debt_Italy_2   = mean(debt_Italy(nblong-7:nblong));
av_debt_Japan_2   = mean(debt_Japan(nblong-7:nblong));
av_debt_Portugal_2= mean(debt_Portugal(nblong-7:nblong));
av_debt_Spain_2   = mean(debt_Spain(nblong-7:nblong));
av_debt_UK_2      = mean(debt_UK(nblong-7:nblong));
av_debt_US_2      = mean(debt_US(nblong-7:nblong));

```

```
% Average debts by subperiods and country groups
```

```

av_D  = [ av_debt_Denmark av_debt_France av_debt_Germany av_debt_Greece
    av_debt_Italy av_debt_Japan av_debt_Portugal av_debt_Spain av_debt_UK
    av_debt_US];
av_D_2 = [ av_debt_Denmark_2 av_debt_France_2 av_debt_Germany_2
    av_debt_Greece_2 av_debt_Italy_2 av_debt_Japan_2 av_debt_Portugal_2
    av_debt_Spain_2 av_debt_UK_2 av_debt_US_2];
av_D_1 = [ av_debt_Denmark_1 av_debt_France_1 av_debt_Germany_1
    av_debt_Greece_1 av_debt_Italy_1 av_debt_Japan_1 av_debt_Portugal_1
    av_debt_Spain_1 av_debt_UK_1 av_debt_US_1];

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```

av_D_g1   = [ av_debt_Denmark av_debt_Germany ];
av_D_1_g1 = [ av_debt_Denmark_1 av_debt_Germany_1];
av_D_2_g1 = [ av_debt_Denmark_2 av_debt_Germany_2];

av_D_g2   = [ av_debt_France av_debt_Spain];
av_D_1_g2 = [ av_debt_France_1 av_debt_Spain_1];
av_D_2_g2 = [ av_debt_France_2 av_debt_Spain_2 ];

av_D_g3   = [ av_debt_Greece av_debt_Italy av_debt_Japan av_debt_Portugal
               av_debt_UK av_debt_US];
av_D_1_g3 = [ av_debt_Greece_1 av_debt_Italy_1 av_debt_Japan_1
               av_debt_Portugal_1 av_debt_UK_1 av_debt_US_1];
av_D_2_g3 = [ av_debt_Greece_2 av_debt_Italy_2 av_debt_Japan_2
               av_debt_Portugal_2 av_debt_UK_2 av_debt_US_2];

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%-----
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%----- DATA GDP -----
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```
% GDP at constant US 2010 prices, constant PPP (1990-2015)
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```

gdp_Denmark = [170075.2 172445.4      175820.2      175839.0      185215.5
                190823.1      196357.1      202760.1      207257.7      213367.6      221362.3
                223184.4      224225.2      225099.9      231106.0      236506.2      245760.6
                247995.2      246725.4      234619.7      239009.5      242204.5      242753.0
                245018.7      248986.5      252986.7];
gdp_France   = [1688158.4      1705700.2      1732985.8      1722368.6      1762764.8
                1799519.9      1824497.3      1867141.9      1933541.2      1999418.9      2076899.6
                2117491.6      2141174.8      2158722.4      2218873.6      2254546.7      2308091.0
                2362596.5      2367210.6      2297582.8      2342745.4      2391456.5      2395825.5
                2409631.2      2432464.6      2458430.2];
gdp_Germany  = [2413578.7      2536870.7      2585675.2      2560951.8      2623883.9
                2669477.6      2691311.2      2741079.0      2795341.9      2850889.1      2935333.7
                2985101.4      2985101.4      2963910.0      2998586.9      3019778.3      3131514.9
                3233619.1      3268617.0      3084958.0      3210822.2      3328338.3      3344713.5
                3361088.7      3425947.3      3485668.6];
gdp_Greece   = [207089.0 213508.8      215003.3 211563.3 215794.6 220325.6
                226631.6      236794.2      246017.2      253576.3      263515.9      274403.3
                285167.8      301692.0      316960.8      318859.9      336883.2      347911.9
                346745.8      331833.2      313653.3      285008.9      264201.9 255637.9
                257529.1 256779.9];
gdp_Italy    = [1711432.5      1737762.0      1752259.8      1737316.4      1774686.5
                1825918.8      1849406.8      1883350.1      1913786.5      1943638.7      2015749.8
                2051472.7      2056571.6      2059683.5      2092266.5      2112136.0      2154517.8
                2186272.6      2163307.9      2044714.2      2079198.8      2091187.9      2032237.1
                1997116.7      1999386.9      2019334.3];
gdp_Japan    = [3682090.0      3804495.2      3835655.2 3842216.5 3875397.1
                3981666.8      4105095.7      4149287.5      4102452.2      4092115.0      4205857.1
                4222943.3      4227930.7      4292543.7      4387182.7      4460130.7      4523463.8
                4598294.7      4548013.3      4301642.0      4481979.3      4476804.3      4543733.8
                4634630.7      4650187.5      4706893.7];
gdp_Portugal = [202236.4 211070.5 213370.1 209010.4 211027.0 220064.8
                227759.8      237840.9      249237.7      258928.6      268735.5      273957.8
                276064.0      273485.0      278439.4      280574.5      284931.9      292032.4
                292614.4      283900.0      289290.4      284005.5      272565.0      269484.6
                271891.6      276845.7];
gdp_Spain    = [908601.7 931734.7 940392.6 930692.5 952872.7 979148.1
                1005338.2      1042431.3      1087318.2      1136081.9      1196170.4      1244030.1
                1279856.6      1320653.0      1362474.7      1413199.7      1472188.4      1527675.0
                1544749.7      1489544.1      1489753.6      1474874.5      1431693.9      1407273.4
                1426693.7      1475661.5];

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```

gdp_UK      = [1516521.5    1500043.9    1505653.7    1543700.4    1603596.6
1643201.2    1684916.4    1752957.5    1807961.9    1866119.1    1934496.1
1983712.2    2032469.4    2100067.5    2149722.6    2216280.0    2270711.8
2324225.9    2313242.9    2216369.9    2253927.3    2286668.4    2320541.5
2368168.0    2440497.8    2497750.4];
gdp_US      = [9064413.8    9057698.4    9379735.5    9637289.6    10026409.0
10299024.6    10689963.4    11169624.7    11666663.4    12213270.1    12713058.2
12837135.7    13066423.0    13433168.5    13941713.5    14408093.6    14792303.7
15055395.7    15011490.2    14594842.7    14964372.0    15204019.5    15542161.3
15802855.3    16208861.2    16672691.9];

```

```

nblong = length(gdp_Denmark);
for i=1:nblong;
    lgdp_Denmark(i) = log(gdp_Denmark(i));
    lgdp_France(i)  = log(gdp_France(i));
    lgdp_Germany(i) = log(gdp_Germany(i));
    lgdp_Greece(i)  = log(gdp_Greece(i));
    lgdp_Italy(i)   = log(gdp_Italy(i));
    lgdp_Japan(i)   = log(gdp_Japan(i));
    lgdp_Portugal(i)= log(gdp_Portugal(i));
    lgdp_Spain(i)   = log(gdp_Spain(i));
    lgdp_US(i)      = log(gdp_US(i));
    lgdp_UK(i)      = log(gdp_UK(i));
end

```

```

M_denmark_lgdp = mean(diff(lgdp_Denmark));
M_france_lgdp  = mean(diff(lgdp_France));
M_greece_lgdp  = mean(diff(lgdp_Greece));
M_UK_lgdp      = mean(diff(lgdp_UK));
M_japan_lgdp   = mean(diff(lgdp_Japan));
M_US_lgdp      = mean(diff(lgdp_US));
M_italy_lgdp   = mean(diff(lgdp_Italy));
M_spain_lgdp   = mean(diff(lgdp_Spain));
M_germany_lgdp = mean(diff(lgdp_Germany));
M_portugal_lgdp = mean(diff(lgdp_Portugal));

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```

dlgdp = [M_denmark_lgdp M_france_lgdp M_germany_lgdp M_greece_lgdp
M_italy_lgdp M_japan_lgdp M_portugal_lgdp M_spain_lgdp M_UK_lgdp
M_US_lgdp];

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```

M_1_denmark_lgdp = mean(diff(lgdp_Denmark(1:nblong-8)));
M_1_france_lgdp  = mean(diff(lgdp_France(1:nblong-8)));
M_1_greece_lgdp  = mean(diff(lgdp_Greece(1:nblong-8)));
M_1_UK_lgdp      = mean(diff(lgdp_UK(1:nblong-8)));
M_1_japan_lgdp   = mean(diff(lgdp_Japan(1:nblong-8)));
M_1_US_lgdp      = mean(diff(lgdp_US(1:nblong-8)));
M_1_italy_lgdp   = mean(diff(lgdp_Italy(1:nblong-8)));
M_1_spain_lgdp   = mean(diff(lgdp_Spain(1:nblong-8)));
M_1_germany_lgdp = mean(diff(lgdp_Germany(1:nblong-8)));
M_1_portugal_lgdp = mean(diff(lgdp_Portugal(1:nblong-8)));

```

```

dlgdp_1 = [M_1_denmark_lgdp M_1_france_lgdp M_1_germany_lgdp
M_1_greece_lgdp M_1_italy_lgdp M_1_japan_lgdp M_1_portugal_lgdp
M_1_spain_lgdp M_1_UK_lgdp M_1_US_lgdp];

```

```

M_2_denmark_lgdp = mean(diff(lgdp_Denmark(nblong-7:nblong)));
M_2_france_lgdp  = mean(diff(lgdp_France(nblong-7:nblong)));
M_2_greece_lgdp  = mean(diff(lgdp_Greece(nblong-7:nblong)));
M_2_UK_lgdp      = mean(diff(lgdp_UK(nblong-7:nblong)));
M_2_japan_lgdp   = mean(diff(lgdp_Japan(nblong-7:nblong)));

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M_2_US_lgdp = mean(diff(lgdp_US(nblong-7:nblong)));
M_2_italy_lgdp = mean(diff(lgdp_Italy(nblong-7:nblong)));
M_2_spain_lgdp = mean(diff(lgdp_Spain(nblong-7:nblong)));
M_2_germany_lgdp = mean(diff(lgdp_Germany(nblong-7:nblong)));
M_2_portugal_lgdp = mean(diff(lgdp_Portugal(nblong-7:nblong)));

dlgdp_2 = [M_2_denmark_lgdp M_2_france_lgdp M_2_germany_lgdp
           M_2_greece_lgdp M_2_italy_lgdp M_2_japan_lgdp M_2_portugal_lgdp
           M_2_spain_lgdp M_2_UK_lgdp M_2_US_lgdp];

disp('average GDP growth rate 1990-2015')
disp([dlgdp])
disp('average GDP growth rate 1990-2007')
disp([dlgdp_1])
disp('average GDP growth rate 2008-2015')
disp([dlgdp_2])
disp('average Debt to GDP ratio 1990-2015')
disp([av_D])

%-----
%---- Computation of cyclical components (Hodrick-Prescott filter) -----
%----- HP filter -----
lhp      = 100;
ntrunc   = 1;
MHP=[1+lhp -2*lhp lhp zeros(1,nblong-ntrunc+1-3);...
     -2*lhp 1+5*lhp -4*lhp lhp zeros(1,nblong-ntrunc+1-4);...
     zeros(nblong-ntrunc+1-4,nblong-ntrunc+1);...
     zeros(1,nblong-ntrunc+1-4) lhp -4*lhp 1+5*lhp -2*lhp;...
     zeros(1,nblong-ntrunc+1-3) lhp -2*lhp 1+lhp];

for i=3:nblong-ntrunc+1-2
MHP(i,i-2)=lhp;
MHP(i,i-1)=-4*lhp;
MHP(i,i)=1+6*lhp;
MHP(i,i+1)=-4*lhp;
MHP(i,i+2)=lhp;
end

spain_thp(1:nblong) = MHP\lgdp_Spain(1:nblong)';
Spain_chp(1:nblong) = lgdp_Spain(1:nblong)-spain_thp(1:nblong);

portugal_thp(1:nblong) = MHP\lgdp_Portugal(1:nblong)';
Portugal_chp(1:nblong) = lgdp_Portugal(1:nblong)-portugal_thp(1:nblong);

france_thp(1:nblong) = MHP\lgdp_France(1:nblong)';
France_chp(1:nblong) = lgdp_France(1:nblong)-france_thp(1:nblong);

germany_thp(1:nblong) = MHP\lgdp_Germany(1:nblong)';
Germany_chp(1:nblong) = lgdp_Germany(1:nblong)-germany_thp(1:nblong);

italy_thp(1:nblong) = MHP\lgdp_Italy(1:nblong)';
Italy_chp(1:nblong) = lgdp_Italy(1:nblong)-italy_thp(1:nblong);

japan_thp(1:nblong) = MHP\lgdp_Japan(1:nblong)';
Japan_chp(1:nblong) = lgdp_Japan(1:nblong)-japan_thp(1:nblong);

US_thp(1:nblong) = MHP\lgdp_US(1:nblong)';
US_chp(1:nblong) = lgdp_US(1:nblong)-US_thp(1:nblong);

UK_thp(1:nblong) = MHP\lgdp_UK(1:nblong)';

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UK_chp(1:nblong) = lgdp_UK(1:nblong)-UK_thp(1:nblong);

greece_thp(1:nblong) = MHP\lgdp_Greece(1:nblong)';
Greece_chp(1:nblong) = lgdp_Greece(1:nblong)-greece_thp(1:nblong);

denmark_thp(1:nblong) = MHP\lgdp_Denmark(1:nblong)';
Denmark_chp(1:nblong) = lgdp_Denmark(1:nblong)-denmark_thp(1:nblong);

%----- standard deviations of cyclical components -----
ET_france_chp = std(France_chp(1:nblong));
ET_denmark_chp = std(Denmark_chp(1:nblong));
ET_greece_chp = std(Greece_chp(1:nblong));
ET_UK_chp = std(UK_chp(1:nblong));
ET_japan_chp = std(Japan_chp(1:nblong));
ET_US_chp = std(US_chp(1:nblong));
ET_italy_chp = std(Italy_chp(1:nblong));
ET_spain_chp = std(Spain_chp(1:nblong));
ET_germany_chp = std(Germany_chp(1:nblong));
ET_portugal_chp = std(Portugal_chp(1:nblong));

ET_france_chp_2 = std(France_chp(nblong-7:nblong));
ET_denmark_chp_2 = std(Denmark_chp(nblong-7:nblong));
ET_greece_chp_2 = std(Greece_chp(nblong-7:nblong));
ET_UK_chp_2 = std(UK_chp(nblong-7:nblong));
ET_japan_chp_2 = std(Japan_chp(nblong-7:nblong));
ET_US_chp_2 = std(US_chp(nblong-7:nblong));
ET_italy_chp_2 = std(Italy_chp(nblong-7:nblong));
ET_spain_chp_2 = std(Spain_chp(nblong-7:nblong));
ET_germany_chp_2 = std(Germany_chp(nblong-7:nblong));
ET_portugal_chp_2 = std(Portugal_chp(nblong-7:nblong));

ET_france_chp_1 = std(France_chp(1:nblong-8));
ET_denmark_chp_1 = std(Denmark_chp(1:nblong-8));
ET_greece_chp_1 = std(Greece_chp(1:nblong-8));
ET_UK_chp_1 = std(UK_chp(1:nblong-8));
ET_japan_chp_1 = std(Japan_chp(1:nblong-8));
ET_US_chp_1 = std(US_chp(1:nblong-8));
ET_italy_chp_1 = std(Italy_chp(1:nblong-8));
ET_spain_chp_1 = std(Spain_chp(1:nblong-8));
ET_germany_chp_1 = std(Germany_chp(1:nblong-8));
ET_portugal_chp_1 = std(Portugal_chp(1:nblong-8));

ET      = [ET_denmark_chp ET_france_chp ET_germany_chp ET_greece_chp
            ET_italy_chp ET_japan_chp ET_portugal_chp ET_spain_chp ET_UK_chp
            ET_US_chp];
ET_2     = [ET_denmark_chp_2 ET_france_chp_2 ET_germany_chp_2
            ET_greece_chp_2 ET_italy_chp_2 ET_japan_chp_2 ET_portugal_chp_2
            ET_spain_chp_2 ET_UK_chp_2 ET_US_chp_2];
ET_1     = [ET_denmark_chp_1 ET_france_chp_1 ET_germany_chp_1
            ET_greece_chp_1 ET_italy_chp_1 ET_japan_chp_1 ET_portugal_chp_1
            ET_spain_chp_1 ET_UK_chp_1 ET_US_chp_1];

ET_g1    = [ET_denmark_chp ET_germany_chp];
ET_g2    = [ET_france_chp ET_spain_chp];
ET_g3    = [ET_greece_chp ET_italy_chp ET_japan_chp ET_portugal_chp
            ET_UK_chp ET_US_chp];

ET_2_g1  = [ET_denmark_chp_2 ET_germany_chp_2];
ET_2_g2  = [ET_france_chp_2 ET_spain_chp_2];
ET_2_g3  = [ET_greece_chp_2 ET_italy_chp_2 ET_japan_chp_2

```

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    ET_portugal_chp_2    ET_UK_chp_2    ET_US_chp_2];

ET_1_g1    =    [ET_denmark_chp_1    ET_germany_chp_1];
ET_1_g2    =    [ET_france_chp_1 ET_spain_chp_1];
ET_1_g3    =    [ET_greece_chp_1 ET_italy_chp_1 ET_japan_chp_1
    ET_portugal_chp_1 ET_UK_chp_1 ET_US_chp_1];

disp('S-D GDP')
disp([ET]*100)

[xr]=regress(dlgdp',[ones(10,1) av_D'])
[yr]=regress(ET',[ones(10,1) av_D'])

subplot(221),plot(av_D,dlgdp*100,'d',av_D,(xr(1)+av_D*xr(2))*100,'-')
xlabel('DEBT TO GDP RATIO (IN %)')
ylabel('GDP GROWTH RATE (IN %)')
axis([40 170 0 3])
subplot(222),plot(av_D,ET*100,'d',av_D,(yr(1)+av_D*yr(2))*100,'-')
xlabel('DEBT TO GDP RATIO (IN %)')
ylabel('S-D GDP (CYCLICAL COMPONENT)')
axis([40 170 0.005*100 0.07*100])

pause
close

disp('sd / sd_{ger} - 1990-2015')
disp([ET./ET_g1(2)])
disp('sd / sd_{ger} - 1990-2007')
disp([ET_1./ET_1_g1(2)])
disp('sd / sd_{ger} - 2008-2015')
disp([ET_2./ET_2_g1(2)])

%--- Dynamical properties by countries ---
% Finland, Germany: globally determinate
% France, Spain: second long run growth rate (negative)
% Greece, Italy, Japan, Portugal, UK, US: unique locally indeterminate s-s

ddeb = 1;    % start: 1990
dend = 26;   % end: 2015

subplot(221),plot(date(ddeb:dend-8),Denmark_chp(ddeb:dend-8),'-',date(ddeb:
    dend-8),Germany_chp(ddeb:dend-8),':')
title('group 1')
legend('Den','Ger')
axis([1990 2007 -.07 0.07])
ylabel('Deviations from trend')

subplot(222),plot(date(ddeb:dend-8),France_chp(ddeb:dend-8),'-',date(ddeb:
    dend-8),Spain_chp(ddeb:dend-8),':')
title('group 2')
legend('Fra','Spa')
axis([1990 2007 -.07 0.07])
ylabel('Deviations from trend')

subplot(223),plot(date(ddeb:dend-8),Greece_chp(ddeb:dend-8),'-',date(ddeb:
    dend-8),Italy_chp(ddeb:dend-8),'--',date(ddeb:dend-8),Portugal_chp(ddeb:
    dend-8),':')
title('group 3')
legend('Gre','Ita','Por')
axis([1990 2007 -.1 0.1])

```

```

ylabel('Deviations from trend')

subplot(224),plot(date(ddeb:dend-8),UK_chp(ddeb:dend-8),'-',date(ddeb:dend-8),
    ),Japan_chp(ddeb:dend-8),'--',date(ddeb:dend-8),US_chp(ddeb:dend-8),':')
title('group 3')
legend('UK','Jap','US')
axis([1990 2007 -.07 0.07])
ylabel('Deviations from trend')

pause
close

[xrb]=regress(dlgdp_1',[ones(10,1) av_D_1'])
[yrb]=regress(ET_1',[ones(10,1) av_D_1'])

subplot(222),plot(av_D_1,ET_1*100,'d',av_D_1,(yrb(1)+av_D_1*yrb(2))*100,'-')
xlabel('DEBT TO GDP RATIO (IN %) / 1990-2007')
ylabel('S-D GDP / 1990-2007')
axis([30 140 0.01*100 0.04*100])

subplot(221),plot(av_D_1,dlgdp_1*100,'d',av_D_1,(xrb(1)+av_D_1*xrb(2))*100,
    '-')
xlabel('DEBT TO GDP RATIO (IN %) / 1990-2007')
ylabel('GDP GROWTH RATE (IN %) / 1990-2007')
axis([30 140 0.5 4])

pause
close

break

```