Import CSV Data Files and Prepare Data

read_data.m

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Summary

Load basic data from CSV data files into databases where each series is represented by a tseries (time series) object. Prepare the data to be used later with the model: seasonally adjust, convert to quaterly periodicity, and create model-consistent variable names.

Contents

1 Clear Workspace

Clear workspace, close all graphics figures, clear command window, and check the IRIS version.

```
14  clear;
15  close all;
16  clc;
17  irisrequired 20140315;
```

2 Load CSV Data File

The series in the Simple_SPBC.csv file has been downloaded from http://research.stlouisfed.org/fred2.

Quarterly series:

- GDPC96 – Real Gross Domestic Product, 3 Decimal

- GDPCTPI – Gross Domestic Product: Chain-type Price Index

Monthly series:

- AHETPI – Average Hourly Earnings: Total Private Industries

- CPILEGNS – Consumer Price Index for All Urban Consumers: All Items Less Energy, Seasonally Not Adjusted

- CPILEGSL – Consumer Price Index for All Urban Consumers: All Items Less Energy, Seasonally Adjusted

- GS5 – 5-Year Treasury Constant Maturity Rate

- PCE – Personal Consumption Expenditures

- PCEC96 – Real Personal Consumption Expenditures

- TB3MS – 3-Month Treasury Bill: Secondary Market Rate

Daily series:

- SP500 – S&P 500 Index

```
45  rawQ = dbload('Simple_SPBC_quarterly.csv', ...
46      'freq=',4,'dateFormat=','YYYY-MM-01');
47
48  rawM = dbload('Simple_SPBC_monthly.csv', ...
49      'dateFormat=','YYYY-MM-01');
50
51  rawD = dbload('Simple_SPBC_daily.csv', ...
52      'freq=',365,'dateFormat=','YYYY-MM-DD');
53
54  disp('Quarterly Database');
55  rawQ %#ok<NOPTS>
56
57  disp('Monthly Database');
58  rawM %#ok<NOPTS>
59
60  disp('Daily Database');
61  rawD %#ok<NOPTS>
```

```
Quarterly Database
rawQ =
     GDPC96: [64x1 tseries]
    GDPCTPI: [64x1 tseries]
Monthly Database
rawM =
      AHETPI: [192x1 tseries]
    CPILEGNS: [192x1 tseries]
    CPILEGSL: [192x1 tseries]
         GS5: [192x1 tseries]
         PCE: [191x1 tseries]
      PCEC96: [191x1 tseries]
       TB3MS: [192x1 tseries]
Daily Database
rawD =
    SP500: [5869x1 tseries]
```

3 Display Daily Series

Daily time series are printed in tabular format on the screen, with each month occupying one entire row.

```
68  rawD.SP500
```

```
ans =
        tseries object: 5869-by-1
                        D1          D2          D3          D4          D5          D6          D7          D8          D9
        Jan-1995:      NaN         NaN      459.11      460.71      460.34      460.68         NaN         NaN      460.83
        Feb-1995:     470.4      472.78      478.64         NaN         NaN      481.14      480.81      481.19      480.19
        Mar-1995:    485.65      485.13      485.42         NaN         NaN      485.63      482.12      483.14      483.16
        Apr-1995:      NaN         NaN      501.85      505.24      505.57      506.08      506.42         NaN         NaN
        May-1995:    514.26      514.86      520.48      520.54      520.12         NaN         NaN      523.96      523.56
        Jun-1995:    533.49      532.51         NaN         NaN       535.6      535.55      533.13      532.35      527.94
        Jul-1995:      NaN         NaN      547.09         NaN      547.26      553.99      556.37         NaN         NaN
        Aug-1995:    559.64       558.8      558.75      558.94         NaN         NaN      560.03      560.39      559.71
        Sep-1995:    563.84         NaN         NaN         NaN      569.17      570.17      570.29      572.68         NaN
        Oct-1995:      NaN      581.72      582.34      581.47      582.63      582.49         NaN         NaN      578.37
        Nov-1995:    584.22      589.72      590.57         NaN         NaN      588.46      586.32      591.71      593.26
        Dec-1995:    606.98         NaN         NaN      613.68      617.68      620.18      616.17      617.48         NaN
        Jan-1996:      NaN      620.73      621.32       617.7      616.71         NaN         NaN      618.46      609.45
        Feb-1996:    638.46      635.84         NaN         NaN      641.43      646.33      649.93      656.07      656.37
        Mar-1996:    644.37         NaN         NaN      650.81      655.79         652      653.65       633.5         NaN
        Apr-1996:    653.73      655.26      655.88      655.86         NaN         NaN         NaN      644.24      642.19
        May-1996:    654.58      643.38      641.63         NaN         NaN      640.81      638.26      644.77      645.44
        Jun-1996:      NaN         NaN      667.68      672.56      678.44      673.03      673.31         NaN         NaN
        Jul-1996:    675.88      673.61       672.4         NaN      657.44         NaN         NaN      652.54      654.75
        Aug-1996:    650.02      662.49         NaN         NaN      660.23      662.38      664.16      662.59       662.1
        Sep-1996:      NaN         NaN      654.72      655.61      649.44      655.68         NaN         NaN      663.76
        Oct-1996:    689.08      694.01      692.78      701.46         NaN         NaN      703.34      700.64      696.74
        Nov-1996:    703.77         NaN         NaN      706.73      714.14      724.59      727.65      730.82         NaN
        Dec-1996:      NaN      756.56      748.28       745.1      744.38       739.6         NaN         NaN      749.81
        Jan-1997:      NaN      737.01      748.03         NaN         NaN      747.65      753.23      748.41      754.85
        Feb-1997:      NaN         NaN      786.73      789.26      778.28      780.15      789.56         NaN         NaN
        Mar-1997:      NaN         NaN      795.31      790.95      801.99      798.56      804.97         NaN         NaN
        Apr-1997:    759.64      750.11      750.32       757.9         NaN         NaN      762.13      766.12       760.6
        May-1997:    798.53      812.97         NaN         NaN      830.24      827.76      815.62      820.26      824.78
        Jun-1997:      NaN      846.36      845.48      840.11      843.43      858.01         NaN         NaN      862.91
        Jul-1997:    891.03      904.03      916.92         NaN         NaN         NaN       912.2      918.75      907.54
        Aug-1997:    947.14         NaN         NaN       950.3      952.37      960.32      951.19      933.54         NaN
        Sep-1997:      NaN      927.58      927.86      930.87      929.05         NaN         NaN       931.2      933.62
        Oct-1997:    955.41      960.46      965.03         NaN         NaN      972.69      983.12      973.84      970.62
        Nov-1997:      NaN         NaN      938.99      940.76      942.76      938.03      927.51         NaN         NaN
        Dec-1997:    974.78      971.68      976.77       973.1      983.79         NaN         NaN      982.37      975.78
        Jan-1998:      NaN      975.04         NaN         NaN      977.07      966.58         964      956.05      927.69
        Feb-1998:      NaN     1001.27        1006      1006.9     1003.54     1012.46         NaN         NaN     1010.74
        Mar-1998:      NaN      1047.7     1052.02     1047.33     1035.05     1055.69         NaN         NaN     1052.31
        Apr-1998:   1108.15     1120.01      1122.7         NaN         NaN     1121.38     1109.54     1101.65     1110.67
        May-1998:      1121         NaN         NaN     1122.07      1115.5     1104.92     1095.14     1108.14         NaN
        Jun-1998:   1090.98     1093.22     1082.73     1094.83     1113.86         NaN         NaN     1115.72     1118.41
```

```
Jul-1998:  1148.56   1146.42      NaN      NaN      NaN   1157.33   1154.66   1166.38   1158.56
Aug-1998:      NaN       NaN   1112.44   1072.12   1081.43   1089.63   1089.45      NaN      NaN
Sep-1998:   994.26    990.47    982.26    973.89      NaN      NaN      NaN   1023.46    1006.2
Oct-1998:   986.39    1002.6      NaN      NaN    988.56    984.59    970.68    959.44    984.39
Nov-1998:      NaN    1111.6   1110.84   1118.67   1133.85   1141.01      NaN      NaN    1130.2
Dec-1998:  1175.28   1171.25   1150.14   1176.74      NaN      NaN    1187.7   1181.38   1183.49
Jan-1999:      NaN       NaN      NaN    1228.1   1244.78   1272.34   1269.73   1275.09      NaN
Feb-1999:     1273   1261.99   1272.07   1248.49    1239.4      NaN      NaN   1243.77   1216.14
Mar-1999:  1236.16    1225.5    1227.7   1246.64   1275.47      NaN      NaN   1282.73   1279.84
Apr-1999:  1293.72      NaN      NaN      NaN   1321.12   1317.89   1326.89   1343.98   1348.35
May-1999:      NaN       NaN   1354.63      1332   1347.31   1332.05      1345      NaN      NaN
Jun-1999:  1294.26   1294.81   1299.54   1327.75      NaN      NaN   1334.52   1317.33   1318.64
Jul-1999:  1380.96   1391.22      NaN      NaN      NaN   1388.12   1395.86   1394.42   1403.28
Aug-1999:      NaN   1328.05   1322.18   1305.33   1313.71   1300.29      NaN      NaN    1297.8
Sep-1999:  1331.07   1319.11   1357.24      NaN      NaN      NaN   1350.45   1344.15   1347.66
Oct-1999:  1282.81      NaN      NaN    1304.6   1301.35    1325.4   1317.64   1336.02      NaN
Nov-1999:  1354.12   1347.74   1354.93   1362.64   1370.23      NaN      NaN   1377.01   1365.28
Dec-1999:  1397.72   1409.04    1433.3      NaN      NaN   1423.33   1409.17   1403.88   1408.11
Jan-2000:      NaN       NaN   1455.22   1399.42   1402.11   1403.45   1441.47      NaN      NaN
Feb-2000:  1409.28   1409.12   1424.97   1424.37      NaN      NaN   1424.24   1441.72    1411.7
Mar-2000:  1379.19   1381.76   1409.17      NaN      NaN   1391.28   1355.62    1366.7   1401.69
Apr-2000:      NaN       NaN   1505.97   1494.73   1487.37   1501.34   1516.35      NaN      NaN
May-2000:  1468.25   1446.29    1415.1   1409.57   1432.63      NaN      NaN   1424.17   1412.14
Jun-2000:  1448.81   1477.26      NaN      NaN   1467.63   1457.84   1471.36   1461.67   1456.95
Jul-2000:      NaN       NaN   1469.54      NaN   1446.23   1456.67    1478.9      NaN      NaN
Aug-2000:   1438.1    1438.7   1452.56   1462.93      NaN      NaN   1479.32    1482.8   1472.87
Sep-2000:  1520.77      NaN      NaN      NaN   1507.08   1492.25   1502.51    1494.5      NaN
Oct-2000:      NaN   1436.23   1426.46   1434.32   1436.28   1408.99      NaN      NaN   1402.03
Nov-2000:  1421.22   1428.32   1426.69      NaN      NaN   1432.19   1431.87   1409.28   1400.14
Dec-2000:  1315.23      NaN      NaN   1324.97   1376.54   1351.46   1343.55   1369.89      NaN
Jan-2001:      NaN   1283.27   1347.56   1333.34   1298.35      NaN      NaN   1295.86    1300.8
Feb-2001:  1373.47   1349.47      NaN      NaN   1354.31   1352.26   1340.89   1332.53   1314.76
Mar-2001:  1241.23   1234.18      NaN      NaN   1241.41    1253.8   1261.89   1264.74   1233.42
Apr-2001:      NaN   1145.87   1106.46   1103.25   1151.44   1128.43      NaN      NaN   1137.59
May-2001:  1266.44   1267.43   1248.58   1266.61      NaN      NaN   1263.51    1261.2   1255.54
Jun-2001:  1260.67      NaN      NaN   1267.11   1283.57   1270.03   1276.96   1264.96      NaN
Jul-2001:      NaN   1236.71   1234.45      NaN   1219.24   1190.59      NaN      NaN   1198.78
Aug-2001:  1215.93   1220.75   1214.35      NaN      NaN   1200.48    1204.4   1183.53   1183.43
Sep-2001:      NaN       NaN      NaN   1132.94   1131.74    1106.4   1085.78      NaN      NaN
Oct-2001:  1038.55   1051.33   1072.28   1069.63   1071.38      NaN      NaN   1062.44   1056.75
Nov-2001:   1084.1    1087.2      NaN      NaN   1102.84   1118.86    1115.8   1118.54   1120.31
Dec-2001:      NaN       NaN    1129.9    1144.8   1170.35    1167.1   1158.31      NaN      NaN
Jan-2002:      NaN   1154.67   1165.27   1172.51      NaN      NaN   1164.89   1160.71   1155.14
Feb-2002:   1122.2      NaN      NaN   1094.44   1090.02   1083.51   1080.17   1096.22      NaN
Mar-2002:  1131.78      NaN      NaN   1153.84   1146.14   1162.77   1157.54   1164.31      NaN
Apr-2002:  1146.54   1136.76    1125.4   1126.34   1122.73      NaN      NaN   1125.29    1117.8
```

```
May-2002:   1086.46    1084.56    1073.43       NaN        NaN    1052.67    1049.49    1088.85    1073.01
Jun-2002:      NaN        NaN    1040.68    1040.69     1049.9    1029.15    1027.53       NaN        NaN
Jul-2002:    968.65     948.09     953.99       NaN     989.03       NaN        NaN     976.98     952.83
Aug-2002:    884.66     864.24       NaN        NaN      834.6     859.57     876.77     905.46     908.64
Sep-2002:      NaN        NaN     878.02      893.4     879.15     893.92       NaN        NaN     902.96
Oct-2002:    847.91     827.91     818.95     800.58       NaN        NaN     785.28     798.55     776.76
Nov-2002:    900.96       NaN        NaN     908.35     915.39     923.76     902.65     894.74       NaN
Dec-2002:      NaN     934.53     920.75     917.57     906.55     912.23       NaN        NaN        892
Jan-2003:      NaN     909.03     908.59       NaN        NaN     929.01     922.93     909.93     927.58
Feb-2003:      NaN        NaN     860.32      848.2     843.59     838.15     829.69       NaN        NaN
Mar-2003:      NaN        NaN     834.81     821.99     829.85      822.1     828.89       NaN        NaN
Apr-2003:    858.48      880.9     876.45     878.85       NaN        NaN     879.93     878.29     865.99
May-2003:     916.3     930.08       NaN        NaN     926.55     934.39     929.62     920.27     933.41
Jun-2003:      NaN        967     971.56     986.24     990.14     987.76       NaN        NaN     975.93
Jul-2003:    982.32     993.75      985.7       NaN        NaN        NaN    1004.42    1007.84    1002.21
Aug-2003:    980.15       NaN        NaN     982.82     965.46     967.08     974.12     977.59       NaN
Sep-2003:      NaN    1021.99    1026.27    1027.97    1021.39       NaN        NaN    1031.64    1023.17
Oct-2003:   1018.22    1020.24    1029.85       NaN        NaN    1034.35    1039.25    1033.78    1038.73
Nov-2003:      NaN        NaN    1059.02    1053.25    1051.81    1058.05    1053.21       NaN        NaN
Dec-2003:   1070.12    1066.62    1064.73    1069.72     1061.5       NaN        NaN     1069.3    1060.18
Jan-2004:      NaN    1108.48       NaN        NaN    1122.22    1123.67    1126.33    1131.92    1121.86
Feb-2004:      NaN    1135.26    1136.03    1126.52    1128.59    1142.76       NaN        NaN    1139.81
Mar-2004:   1155.96     1149.1    1151.04    1154.88    1156.87       NaN        NaN    1147.21    1140.58
Apr-2004:   1132.17    1141.81       NaN        NaN    1150.57    1148.16    1140.53    1139.32       NaN
May-2004:      NaN        NaN    1117.49    1119.55    1121.53    1113.99     1098.7       NaN        NaN
Jun-2004:    1121.2    1124.99    1116.64     1122.5       NaN        NaN    1140.42    1142.18    1131.33
Jul-2004:   1128.94    1125.38       NaN        NaN        NaN    1116.21    1118.33    1109.11    1112.81
Aug-2004:      NaN    1106.62    1099.69    1098.63     1080.7    1063.97       NaN        NaN    1065.22
Sep-2004:   1105.91    1118.31    1113.63       NaN        NaN        NaN     1121.3    1116.27    1118.38
Oct-2004:    1131.5       NaN        NaN    1135.17    1134.48    1142.05    1130.65    1122.14       NaN
Nov-2004:   1130.51    1130.54     1143.2    1161.67    1166.17       NaN        NaN    1164.89    1164.08
Dec-2004:   1191.37    1190.33    1191.17       NaN        NaN    1190.25    1177.07    1182.81    1189.24
Jan-2005:      NaN        NaN    1202.08    1188.05    1183.74    1187.89    1186.19       NaN        NaN
Feb-2005:   1189.41    1193.19    1189.89    1203.03       NaN        NaN    1201.72     1202.3    1191.99
Mar-2005:   1210.41    1210.08    1210.47    1222.12       NaN        NaN    1225.31    1219.43    1207.01
Apr-2005:   1172.92       NaN        NaN    1176.12    1181.39    1184.07    1191.14     1181.2       NaN
May-2005:      NaN    1162.16    1161.17    1175.65    1172.63    1171.35       NaN        NaN    1178.84
Jun-2005:   1202.27    1204.29    1196.02       NaN        NaN    1197.51    1197.26    1194.67    1200.93
Jul-2005:   1194.44       NaN        NaN        NaN    1204.99    1194.94    1197.87    1211.86       NaN
Aug-2005:   1235.35    1244.12    1245.04    1235.86    1226.42       NaN        NaN    1223.13    1231.38
Sep-2005:   1221.59    1218.02       NaN        NaN        NaN    1233.39    1236.36    1231.67    1241.48
Oct-2005:      NaN        NaN     1226.7    1214.47    1196.39    1191.49     1195.9       NaN        NaN
Nov-2005:   1202.76    1214.76    1219.94    1220.14       NaN        NaN    1222.81    1218.59    1220.65
Dec-2005:   1264.67    1265.08       NaN        NaN    1262.09     1263.7    1257.37    1255.84    1259.37
Jan-2006:      NaN        NaN     1268.8    1273.46    1273.48    1285.45       NaN        NaN    1290.15
Feb-2006:   1282.46    1270.84    1264.03       NaN        NaN    1265.02    1254.78    1265.65    1263.78
```

```
Mar-2006:  1291.24   1289.14   1287.23       NaN       NaN   1278.26   1275.88   1278.47   1272.23
Apr-2006:      NaN       NaN   1297.81   1305.93   1311.56   1309.04    1295.5       NaN       NaN
May-2006:  1305.19   1313.21   1307.85   1312.25   1325.76       NaN       NaN   1324.66   1325.14
Jun-2006:  1285.71   1288.22       NaN       NaN   1265.29   1263.85   1256.15   1257.93    1252.3
Jul-2006:      NaN       NaN   1280.19       NaN   1270.91   1274.08   1265.48       NaN       NaN
Aug-2006:  1270.92   1278.55   1280.27   1279.36       NaN       NaN   1275.77   1271.48   1265.95
Sep-2006:  1311.01       NaN       NaN       NaN   1313.25   1300.26   1294.02   1298.92       NaN
Oct-2006:      NaN   1331.32   1334.11   1350.22   1353.22   1349.58       NaN       NaN   1350.66
Nov-2006:  1367.81   1367.34    1364.3       NaN       NaN   1379.78   1382.84   1385.72   1378.33
Dec-2006:  1396.71       NaN       NaN   1409.12   1414.76    1412.9   1407.29   1409.84       NaN
Jan-2007:      NaN       NaN    1416.6   1418.34   1409.71       NaN       NaN   1412.84   1412.11
Feb-2007:  1445.94   1448.39       NaN       NaN   1446.99      1448   1450.02   1448.31   1438.06
Mar-2007:  1403.17   1387.17       NaN       NaN   1374.12   1395.41   1391.97   1401.89   1402.85
Apr-2007:      NaN   1424.55   1437.77   1439.37   1443.76       NaN       NaN       NaN   1444.61
May-2007:   1486.3   1495.92   1502.39   1505.62       NaN       NaN   1509.48   1507.72   1512.58
Jun-2007:  1536.34       NaN       NaN   1539.18   1530.95   1517.38   1490.72   1507.67       NaN
Jul-2007:      NaN   1519.43   1524.87       NaN    1525.4   1530.44       NaN       NaN   1531.85
Aug-2007:  1465.81    1472.2   1433.06       NaN       NaN   1467.67   1476.71   1497.49   1453.09
Sep-2007:      NaN       NaN       NaN   1489.42   1472.29   1478.55   1453.55       NaN       NaN
Oct-2007:  1547.04   1546.63   1539.59   1542.84   1557.59       NaN       NaN   1552.58   1565.15
Nov-2007:  1508.44   1509.65       NaN       NaN   1502.17   1520.27   1475.62   1474.77    1453.7
Dec-2007:      NaN       NaN   1472.42   1462.79   1485.01   1507.34   1504.66       NaN       NaN
Jan-2008:      NaN   1447.16   1447.16   1411.63       NaN       NaN   1416.18   1390.19   1409.13
Feb-2008:  1395.42       NaN       NaN   1380.82   1336.64   1326.45   1336.91   1331.29       NaN
Mar-2008:      NaN       NaN   1331.34   1326.75    1333.7   1304.34   1293.37       NaN       NaN
Apr-2008:  1370.18   1367.53   1369.31    1370.4       NaN       NaN   1372.54   1365.54   1354.49
May-2008:  1409.34    1413.9       NaN       NaN   1407.49   1418.26   1392.57   1397.68   1388.28
Jun-2008:      NaN   1385.67   1377.65    1377.2   1404.05   1360.68       NaN       NaN   1361.76
Jul-2008:  1284.91   1261.52    1262.9       NaN       NaN       NaN   1252.31    1273.7   1244.69
Aug-2008:  1260.31       NaN       NaN   1249.01   1284.88   1289.19   1266.07   1296.32       NaN
Sep-2008:      NaN   1277.58   1274.98   1236.83   1242.31       NaN       NaN   1267.79   1224.51
Oct-2008:  1161.06   1114.28   1099.23       NaN       NaN   1056.89    996.23    984.94    909.92
Nov-2008:      NaN       NaN     966.3   1005.75    952.77    904.88    930.99       NaN       NaN
Dec-2008:   816.21    848.81    870.74    845.22    876.07       NaN       NaN     909.7    888.67
Jan-2009:      NaN     931.8       NaN       NaN    927.45     934.7    906.65    909.73    890.35
Feb-2009:      NaN    825.44    838.51    832.23    845.85     868.6       NaN       NaN    869.89
Mar-2009:      NaN    700.82    696.33    712.87    682.55    683.38       NaN       NaN    676.53
Apr-2009:   811.08    834.38     842.5       NaN       NaN    835.48    815.55    825.16    856.56
May-2009:   877.52       NaN       NaN    907.24     903.8    919.53    907.39    929.23       NaN
Jun-2009:   942.87    944.74    931.76    942.46    940.09       NaN       NaN    939.14    942.43
Jul-2009:   923.33    896.42       NaN       NaN       NaN    898.72    881.03    879.56    882.68
Aug-2009:      NaN       NaN   1002.63   1005.65   1002.72    997.08   1010.48       NaN       NaN
Sep-2009:   998.04    994.75   1003.24    1016.4       NaN       NaN       NaN   1025.39   1033.37
Oct-2009:  1029.85   1025.21       NaN       NaN   1040.46   1054.72   1057.58   1065.48   1071.49
Nov-2009:      NaN   1042.88   1045.41    1046.5   1066.63    1069.3       NaN       NaN   1093.08
Dec-2009:  1108.86   1109.24   1099.92   1105.98       NaN       NaN   1103.25   1091.94   1095.95
```

```
    Jan-2010:      NaN       NaN       NaN   1132.99   1136.52   1137.14   1141.69   1144.98       NaN
    Feb-2010:  1089.19   1103.32   1097.28   1063.11   1066.19       NaN       NaN   1056.74   1070.52
    Mar-2010:  1115.71   1118.31   1118.79   1122.97    1138.7       NaN       NaN    1138.5   1140.45
    Apr-2010:   1178.1       NaN       NaN       NaN   1187.44   1189.44   1182.45   1186.44   1194.37
    May-2010:      NaN       NaN   1202.26    1173.6    1165.9   1128.15   1110.88       NaN       NaN
    Jun-2010:  1070.71   1098.38   1102.83   1064.88       NaN       NaN   1050.47      1062   1055.69
    Jul-2010:  1027.37   1022.58       NaN       NaN       NaN   1028.06   1060.27   1070.25   1077.96
    Aug-2010:      NaN   1125.86   1120.46   1127.24   1125.81   1121.64       NaN       NaN   1127.79
    Sep-2010:  1080.29    1090.1   1104.51       NaN       NaN       NaN   1091.84   1098.87   1104.18
    Oct-2010:  1146.24       NaN       NaN   1137.03   1160.75   1159.97   1158.06   1165.15       NaN
    Nov-2010:  1184.38   1193.57   1197.96   1221.06   1225.85       NaN       NaN   1223.25    1213.4
    Dec-2010:  1206.07   1221.53   1224.71       NaN       NaN   1223.12   1223.75   1228.28      1233
    Jan-2011:      NaN       NaN   1271.87    1270.2   1276.56   1273.85    1271.5       NaN       NaN
    ''

user data: empty
export files: [0]
```

4   Seasonally Adjust Some Series

The only seasonal series is CPILEGNS. Run the standard X12 on it, and compare the results with CPILEGSL which is the same CPI series but seasonally adjusted by the U.S. Department of Labor. Check the correlations between the three consumer deflator series.

```
77   rawM.CPILEGNSsa = x12(rawM.CPILEGNS);
78
79   figure();
80   plot(pct([rawM.CPILEGNS,rawM.CPILEGNSsa,rawM.CPILEGSL]));
81   axis tight;
82   grid on;
83   legend('CPILEGNS','CPILEGNS X12 adjusted','CPILEGSL');
84   title('CPI Inflation, 1Q ROC');
85
86   [C,R] = acf(pct([rawM.CPILEGNS,rawM.CPILEGNSsa,rawM.CPILEGSL]));
87   disp('Cross-Correlations CPILEGNS, CPILEGNSsa, CPILEGSL, 1Q Growth Rates');
88   R %#ok<NOPTS>
```
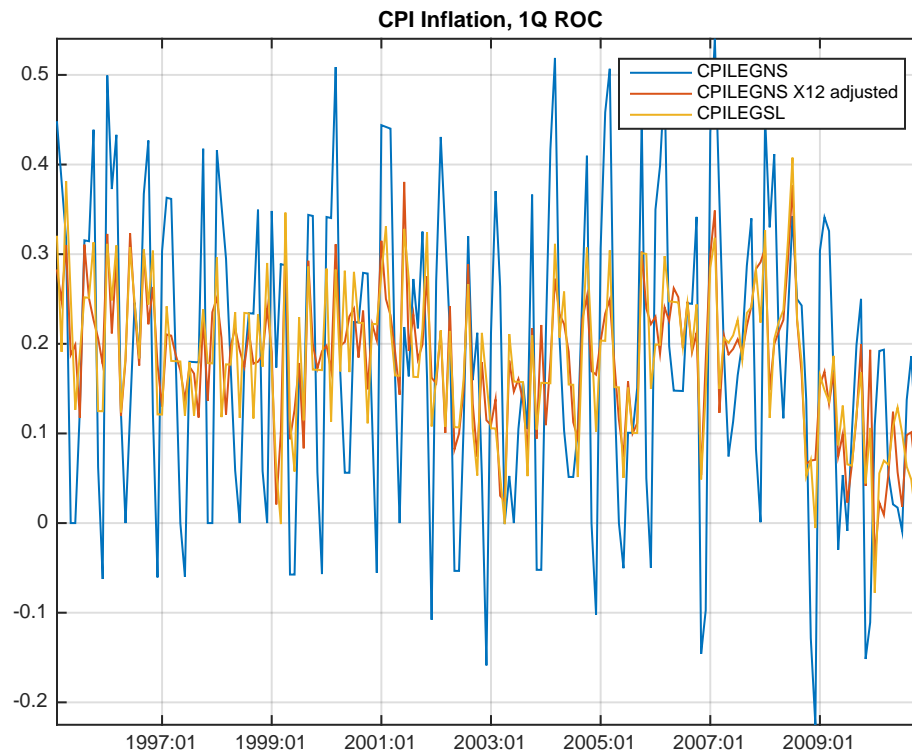
```
Cross-Correlations CPILEGNS, CPILEGNSsa, CPILEGSL, 1Q Growth Rates
R =
    1.0000    0.4835    0.5184
    0.4835    1.0000    0.8777
    0.5184    0.8777    1.0000
```

CPI Inflation, 1Q ROC

5 Convert Monthly and Daily Series to Quarterly

Convert the daily and monthly series to quarterly, and add them to the database Raw4; the default conversion method is simple averaging. Create also a new series for the consumer deflator.

```
96   rawQ.AHETPI = convert(rawM.AHETPI,4);
97   rawQ.CPILEGNS = convert(rawM.CPILEGNS,4);
98   rawQ.CPILEGNSsa = convert(rawM.CPILEGNSsa,4);
99   rawQ.CPILEGSL = convert(rawM.CPILEGSL,4);
100  rawQ.GS5 = convert(rawM.GS5,4);
101  rawQ.PCE = convert(rawM.PCE,4);
102  rawQ.PCEC96 = convert(rawM.PCEC96,4);
103  rawQ.TB3MS = convert(rawM.TB3MS,4);
104  rawQ.SP500 = convert(rawD.SP500,4);
105
106  rawQ.PCEP = rawQ.PCE/rawQ.PCEC96;
107
108  disp('Combined quarterly, monthly and daily data');
```

```
109    disp('(converted all to quarterly)');
110    rawQ %#ok<NOPTS>
```

```
Combined quarterly, monthly and daily data
(converted all to quarterly)
rawQ =
          GDPC96: [64x1 tseries]
         GDPCTPI: [64x1 tseries]
          AHETPI: [64x1 tseries]
         CPILEGNS: [64x1 tseries]
      CPILEGNSsa: [64x1 tseries]
        CPILEGSL: [64x1 tseries]
             GS5: [64x1 tseries]
             PCE: [63x1 tseries]
          PCEC96: [63x1 tseries]
            TB3MS: [64x1 tseries]
            SP500: [65x1 tseries]
             PCEP: [63x1 tseries]
```

The six conversion lines above can be replaced with the following single batch command:

```
Raw4 = dbbatch(Raw,'$0','convert(Raw12.$0,"quarterly")');
```

6   Create Model Consistent Variable Names

Create a new database with model-consistent measurement variable names. Also find the start and end dates for the historical series (based on the Growth series, which has the longest release lag). The function apct calculates annualised percent rates of change.

```
127    d = struct();
128
129    d.Infl = apct(rawQ.GDPCTPI); % apct(Raw4.PCEP);
130    d.Short = rawQ.TB3MS;
131    d.Growth = apct(rawQ.GDPC96); %apct(Raw4.PCEC96);
132    d.Wage = apct(rawQ.AHETPI);
133    d.Asset = apct(rawQ.SP500);
134    d.Long = rawQ.GS5;
135
136    startHist = get(d.Growth,'start');
137    endHist = get(d.Growth,'end');
138
139    disp('Historical range');
```

```
140   dat2str(startHist:endHist)
```

```
Historical range
ans =
  Columns 1 through 6
    '1995Q2'    '1995Q3'    '1995Q4'    '1996Q1'    '1996Q2'    '1996Q3'
  Columns 7 through 12
    '1996Q4'    '1997Q1'    '1997Q2'    '1997Q3'    '1997Q4'    '1998Q1'
  Columns 13 through 18
    '1998Q2'    '1998Q3'    '1998Q4'    '1999Q1'    '1999Q2'    '1999Q3'
  Columns 19 through 24
    '1999Q4'    '2000Q1'    '2000Q2'    '2000Q3'    '2000Q4'    '2001Q1'
  Columns 25 through 30
    '2001Q2'    '2001Q3'    '2001Q4'    '2002Q1'    '2002Q2'    '2002Q3'
  Columns 31 through 36
    '2002Q4'    '2003Q1'    '2003Q2'    '2003Q3'    '2003Q4'    '2004Q1'
  Columns 37 through 42
    '2004Q2'    '2004Q3'    '2004Q4'    '2005Q1'    '2005Q2'    '2005Q3'
  Columns 43 through 48
    '2005Q4'    '2006Q1'    '2006Q2'    '2006Q3'    '2006Q4'    '2007Q1'
  Columns 49 through 54
    '2007Q2'    '2007Q3'    '2007Q4'    '2008Q1'    '2008Q2'    '2008Q3'
  Columns 55 through 60
    '2008Q4'    '2009Q1'    '2009Q2'    '2009Q3'    '2009Q4'    '2010Q1'
  Columns 61 through 63
    '2010Q2'    '2010Q3'    '2010Q4'
```

7   Run HP Filter with Tunes

Illustrate the use of the HP filter with tunes, and plot the trends against the data. The trends are calculated for this example only, and are not needed otherwise.

- Inflation

```
152   d.Infl_tnd = hpf(d.Infl);  1
153
154   x = tseries();
155   x(endHist) = 2.5;
156   d.Infl_tnd2 = hpf(d.Infl,Inf,'lambda=',5000,'level=',x);  2
```

- Wage inflation

```
162  d.Wage_tnd = hpf(d.Wage);  1
163
164  x = tseries();
165  x(endHist) = 0;
166  d.Wage_tnd2 = hpf(d.Wage,Inf,'lambda=',5000,'change=',x);  2
```

- Short interest rates

```
172  d.Short_tnd = hpf(d.Short);  1
173
174  x = tseries();
175  x(endHist) = 0;
176  d.Short_tnd2 = hpf(d.Short,Inf,'lambda=',5000,'change=',x);  2
```

- Long interest rates

```
182  d.Long_tnd = hpf(d.Long);  1
183
184  x = tseries();
185  x(endHist) = 0;
186  d.Long_tnd2 = hpf(d.Long,Inf,'lambda=',5000,'change=',x);  2
```

- Growth

```
192  d.Growth_tnd = hpf(d.Growth);  1
193
194  x = tseries();
195  x(endHist) = 2;
196  d.Growth_tnd2 = hpf(d.Growth,Inf,'lambda=',5000,'level=',x);  2
```

- Asset price change

```
202  d.Asset_tnd = hpf(d.Asset);  1
203
204  x = tseries();
205  x(endHist) = 0;
206  d.Asset_tnd2 = hpf(d.Asset,Inf,'lambda=',5000,'change=',x);  2
207
208  d %#ok<NOPTS>
```

```
d =
           Infl: [63x1 tseries]
          Short: [64x1 tseries]
         Growth: [63x1 tseries]
           Wage: [63x1 tseries]
          Asset: [64x1 tseries]
           Long: [64x1 tseries]
       Infl_tnd: [63x1 tseries]
      Infl_tnd2: [63x1 tseries]
       Wage_tnd: [63x1 tseries]
      Wage_tnd2: [63x1 tseries]
      Short_tnd: [64x1 tseries]
     Short_tnd2: [64x1 tseries]
       Long_tnd: [64x1 tseries]
      Long_tnd2: [64x1 tseries]
     Growth_tnd: [63x1 tseries]
    Growth_tnd2: [63x1 tseries]
      Asset_tnd: [64x1 tseries]
     Asset_tnd2: [64x1 tseries]
```

[1] Plain HP with the default λ for quarterly series $\lambda = 1,600$.

[2] HP with a stiffer trend, $\lambda = 5,000$, and tunes on the trend paths. Note that the tunes are imposed either on the level of the trend, or on the change in the trend, depending on the variable.

8   Plot Data

The function dbplot creates graphs based on the list supplied as the third input argument.

```
223  dbplot(d,Inf, ...
224         { ...
225      ' "Consumer Deflator Inflation, 1Q ROC PA" [Infl,Infl_tnd,Infl_tnd2]', ...
```

```
226        ' "Wage Inflation, 1Q ROC PA" [Wage,Wage_tnd,Wage_tnd2]', ...
227        ' "3-Month Treasury Bill Rate, PA" [Short,Short_tnd,Short_tnd2]', ...
228        ' "5-Year Treasury Const Maturity Rate, PA" [Long,Long_tnd,Long_tnd2]', ...
229        ' "Consumption Growth, 1Q ROC PA" [Growth,Growth_tnd,Growth_tnd2]', ...
230        ' "Asset Price Change, 1Q ROC PA" [Asset,Asset_tnd,Asset_tnd2]', ...
231        }, ...
232        'tight=',true);
233
234 grfun.bottomlegend('Data','HP Plain','HP Tuned');
235 grfun.ftitle('U.S. Data for SPBC Tutorial');
```

U.S. Data for SPBC Tutorial

Consumer Deflator Inflation, 1Q ROC PA **Wage Inflation, 1Q ROC PA**
3-Month Treasury Bill Rate, PA **5-Year Treasury Const Maturity Rate, PA**
Consumption Growth, 1Q ROC PA **Asset Price Change, 1Q ROC PA**
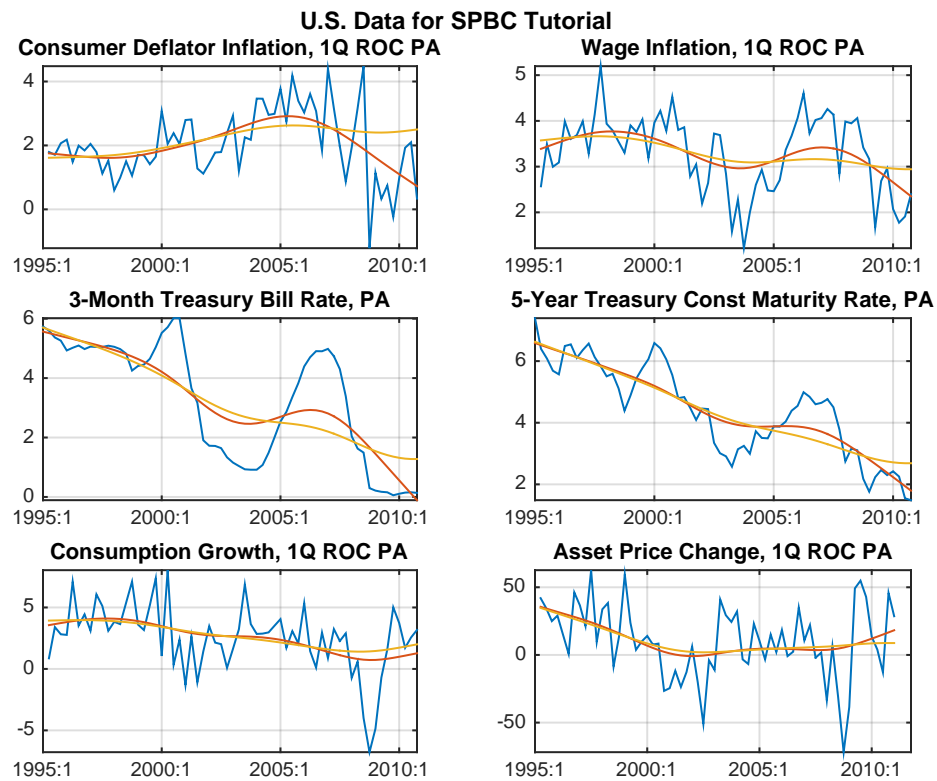
9   Save Data for Future Use

Save the final database and the dates in a mat-file (binary file) for future use.

```
242  save read_data.mat d startHist endHist;
```

10 Help on IRIS Functions Used in This File

Use either help to display help in the command window, or idoc to display help in an HTML browser window. help dbload help dbbatch help tseris/acf help tseries/apct help tseries/convert help tseries/x12 help qreport/qplot help qreportlang