

Research Assistantship - Data Collection

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DATA COLLECTION

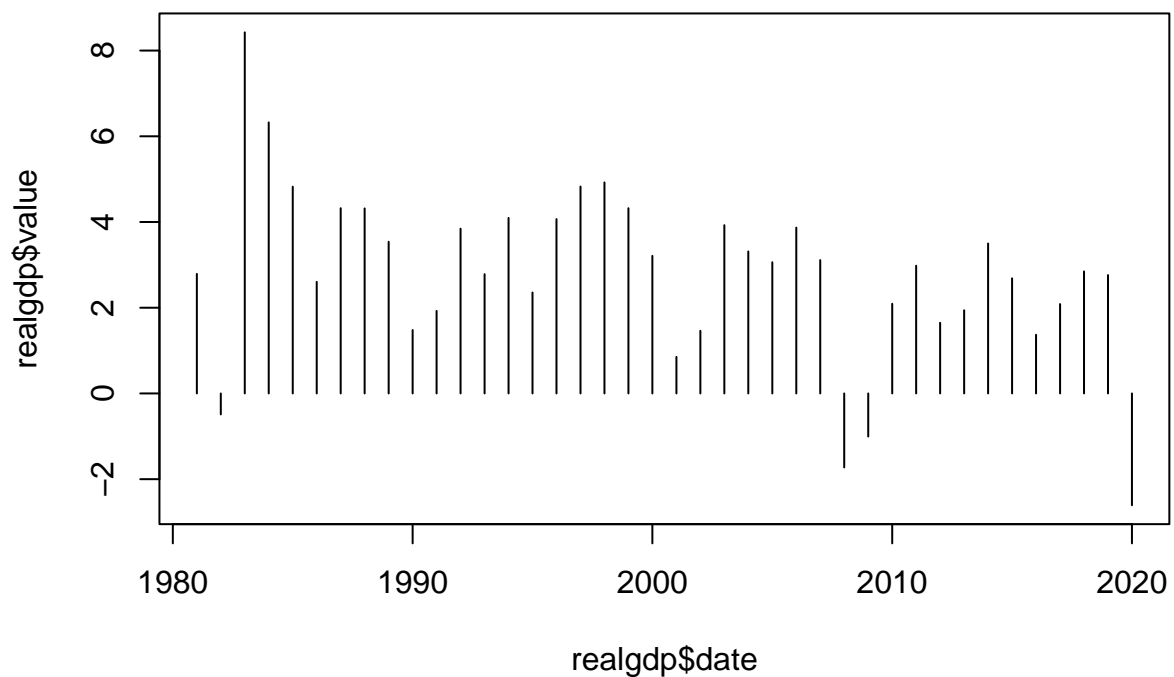
Real GDP Data

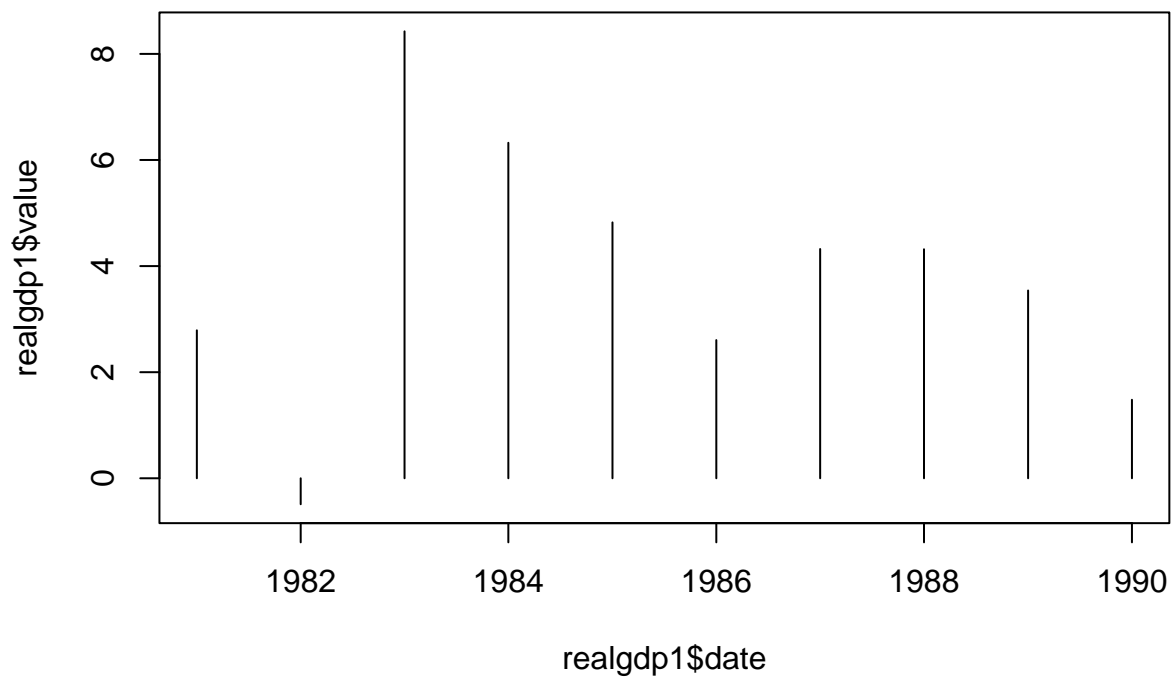
In this first part, we download nominal GDP data and GDP deflator data from 1980 to 2020 and then we divide it into the 2 section (1980s and 2010s) in order to calculate means and thus compare it to the data we got in the TTD Presentation.

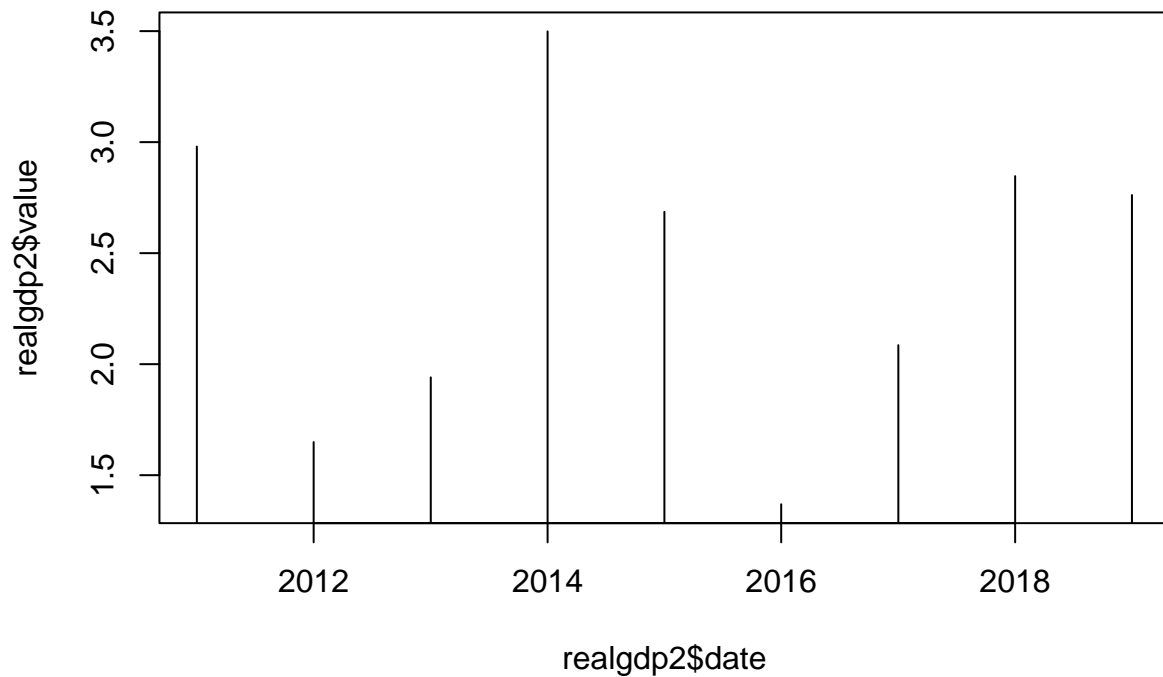
```
## [1] 2.816635
```

```
## [1] 3.813955
```

```
## [1] 2.424288
```







Labor Share of Output

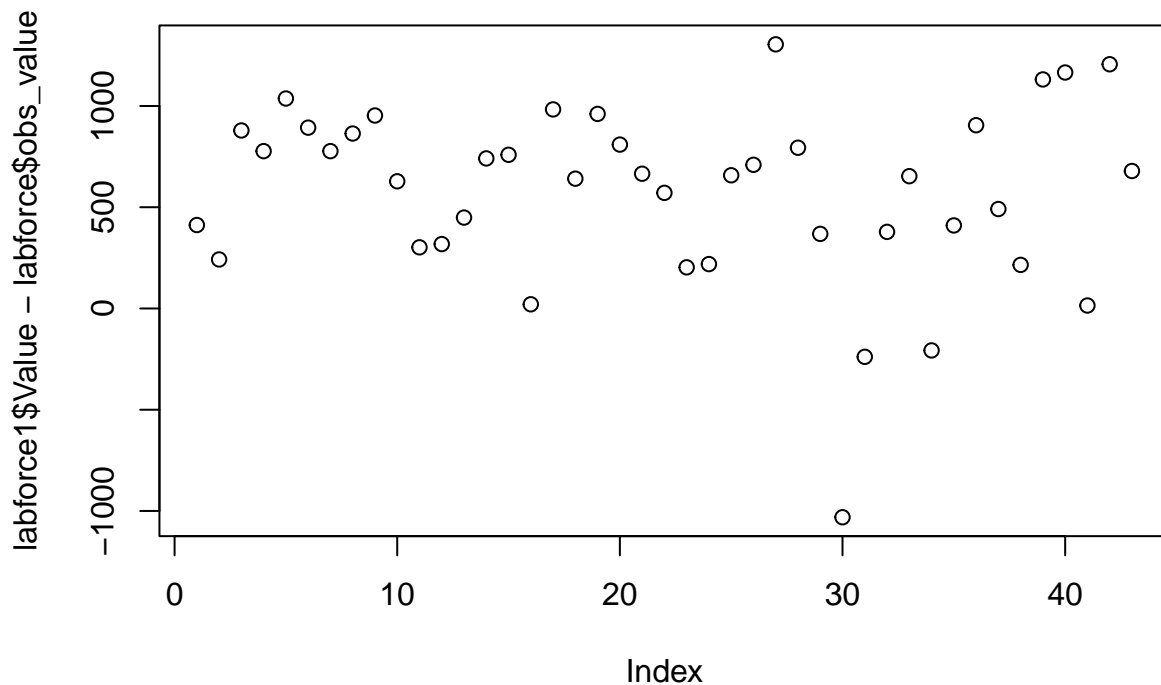
“Naive” Labor Share

First attempt here is to download the laborshare timeseries from fred. However, this approach neglects some important aspects, such as the role of self-employed workers and correction to value added in the forms of indirect taxes and consumption of fixed capital.

Guerriero Index

This is precisely why I tried to replicate the laborshare measure provided by Guerriero (2019), defined as:

$$LS6 = \frac{\text{compensation of employees} * \left(\frac{\text{workforce} - \text{employers}}{\text{employees}} \right)}{\text{value added} - \text{ind. taxes} - \text{fixed cap. cons.}}$$



```
##
## #####
## # Augmented Dickey-Fuller Test Unit Root Test #
## #####
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -7.085e+09 -2.684e+08  4.544e+08  9.162e+08  6.895e+09
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.821e+08  1.063e+09   0.454   0.6588
## z.lag.1      -5.694e-01  2.167e-01  -2.627   0.0235 *
## z.diff.lag    6.012e-01  2.718e-01   2.212   0.0491 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.916e+09 on 11 degrees of freedom
## Multiple R-squared:  0.4223, Adjusted R-squared:  0.3173
## F-statistic: 4.021 on 2 and 11 DF, p-value: 0.04889
```

```

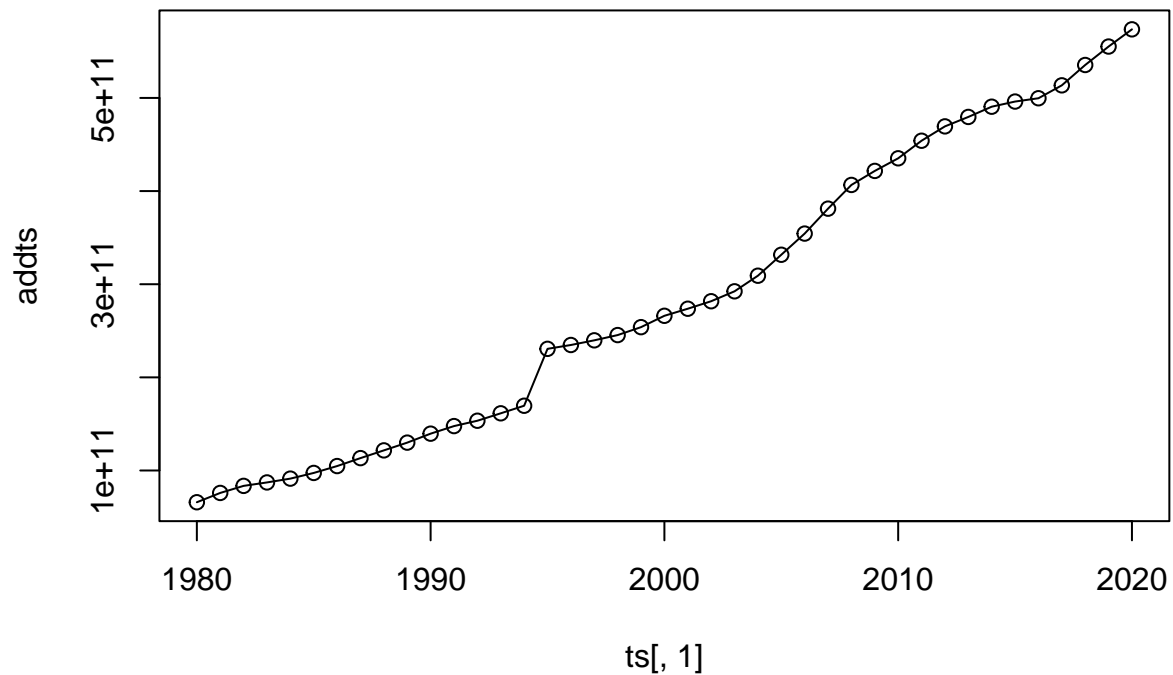
##
##
## Value of test-statistic is: -2.6273 3.452
##
## Critical values for test statistics:
##      1pct  5pct 10pct
## tau2 -3.75 -3.00 -2.63
## phi1  7.88  5.18  4.12
##
##
## =====
##                      Dependent variable:
##                      -----
##                      s1
## -----
## lag_s1                1.072***
##                      (0.021)
##
## Constant              -8,250,169,233.000
##                      (6,753,307,947.000)
##
## -----
## Observations                16
## R2                          0.995
## Adjusted R2                 0.994
## Residual Std. Error 5,773,614,796.000 (df = 14)
## F Statistic      2,533.752*** (df = 1; 14)
## =====
## Note:          *p<0.1; **p<0.05; ***p<0.01
##
## #####
## # Augmented Dickey-Fuller Test Unit Root Test #
## #####
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.782e+09 -1.537e+09 -3.670e+08  1.329e+09  5.376e+09
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.979e+08  6.768e+08   0.588  0.5685
## z.lag.1      -6.951e-01  2.334e-01  -2.978  0.0126 *
## z.diff.lag    6.937e-01  2.924e-01   2.372  0.0370 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.481e+09 on 11 degrees of freedom
## Multiple R-squared:  0.4666, Adjusted R-squared:  0.3697

```

```

## F-statistic: 4.812 on 2 and 11 DF,  p-value: 0.03152
##
##
## Value of test-statistic is: -2.9778 4.4372
##
## Critical values for test statistics:
##      1pct  5pct 10pct
## tau2 -3.75 -3.00 -2.63
## phi1  7.88  5.18  4.12
##
##
## =====
##                      Dependent variable:
##                      -----
##                      s2
## -----
## lag_s2                      1.035***
##                      (0.020)
##
## Constant                      3,403,259,047.000
##                      (3,258,937,291.000)
##
## -----
## Observations                      16
## R2                      0.995
## Adjusted R2                      0.994
## Residual Std. Error 3,504,860,995.000 (df = 14)
## F Statistic          2,681.792*** (df = 1; 14)
## =====
## Note:          *p<0.1; **p<0.05; ***p<0.01
##
## =====
##                      Dependent variable:
##                      -----
##                      s1
## -----
## s2                      1.850***
##                      (0.208)
##
## Constant                      -2,522,381,155.000
##                      (1,997,242,452.000)
##
## -----
## Observations                      16
## R2                      0.850
## Adjusted R2                      0.839
## Residual Std. Error 3,007,268,669.000 (df = 14)
## F Statistic          79.400*** (df = 1; 14)
## =====
## Note:          *p<0.1; **p<0.05; ***p<0.01
##
## =====
## TRUE
## -----

```



```
##
## #####
## # Augmented Dickey-Fuller Test Unit Root Test #
## #####
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.397e+10 -4.067e+07  2.066e+09  7.209e+09  1.795e+10
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -8.930e+08  4.250e+09  -0.210   0.837
## z.lag.1      -2.202e-01  2.826e-01  -0.779   0.452
## z.diff.lag    3.626e-01  3.698e-01   0.980   0.348
##
## Residual standard error: 1.491e+10 on 11 degrees of freedom
## Multiple R-squared:  0.107, Adjusted R-squared:  -0.05531
## F-statistic: 0.6593 on 2 and 11 DF,  p-value: 0.5365
##
##
```

```

## Value of test-statistic is: -0.7791 0.4277
##
## Critical values for test statistics:
##      1pct  5pct 10pct
## tau2 -3.75 -3.00 -2.63
## phi1  7.88  5.18  4.12
##
##
## =====
##                        Dependent variable:
##      -----
##                        s1
##      -----
## lag_s1                        1.022***
##                        (0.016)
##
## Constant                    32,300,824,321.000
##                        (23,705,657,522.000)
##
## -----
## Observations                    16
## R2                            0.997
## Adjusted R2                    0.996
## Residual Std. Error 21,046,319,844.000 (df = 14)
## F Statistic            4,139.821*** (df = 1; 14)
## =====
## Note:                *p<0.1; **p<0.05; ***p<0.01
##
## #####
## # Augmented Dickey-Fuller Test Unit Root Test #
## #####
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min        1Q      Median        3Q       Max
## -2.172e+10 -4.903e+09 -1.365e+09  9.736e+09  1.852e+10
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.186e+07  3.786e+09   0.003   0.998
## z.lag.1      -3.078e-01  2.432e-01  -1.266   0.232
## z.diff.lag    4.854e-01  3.129e-01   1.551   0.149
##
## Residual standard error: 1.355e+10 on 11 degrees of freedom
## Multiple R-squared:  0.2093, Adjusted R-squared:  0.06558
## F-statistic: 1.456 on 2 and 11 DF,  p-value: 0.2748
##
##
## Value of test-statistic is: -1.2659 0.8741

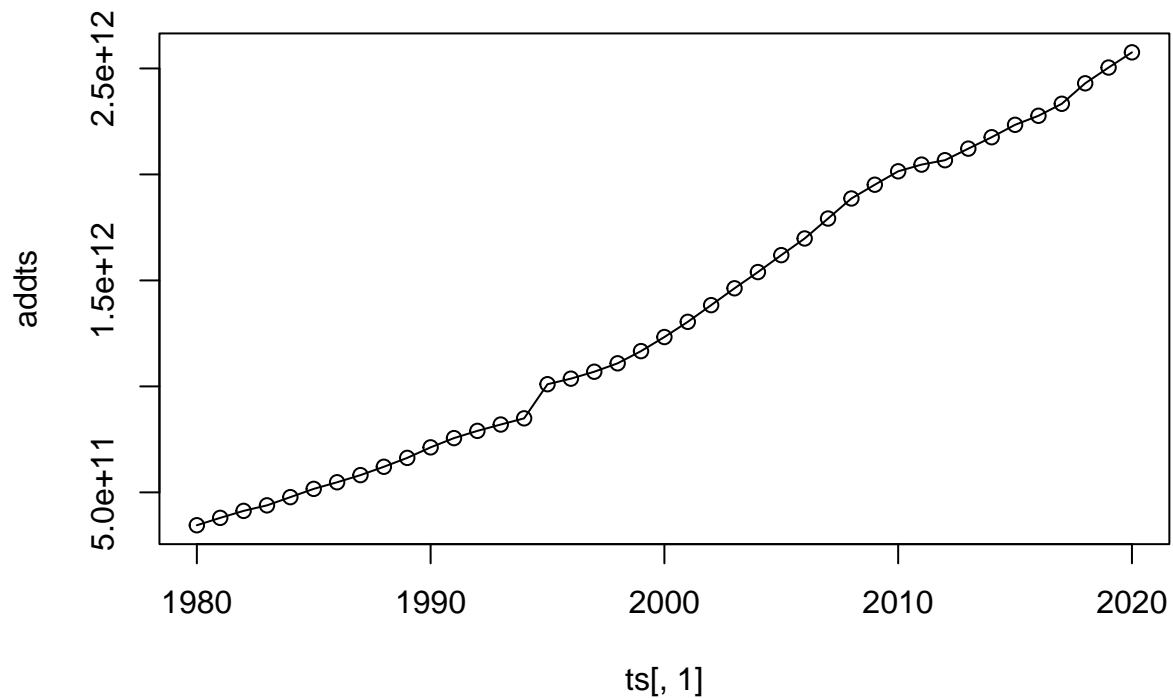
```



```

##
## Critical values for test statistics:
##      1pct  5pct 10pct
## tau2 -3.75 -3.00 -2.63
## phi1  7.88  5.18  4.12
##
##
## =====
##                        Dependent variable:
##                        -----
##                        s2
## -----
## lag_s2                      1.019***
##                        (0.017)
##
## Constant                    34,748,116,629.000
##                        (22,551,045,966.000)
##
## -----
## Observations                  16
## R2                          0.996
## Adjusted R2                  0.996
## Residual Std. Error 20,958,000,953.000 (df = 14)
## F Statistic              3,560.294*** (df = 1; 14)
## =====
## Note:                        *p<0.1; **p<0.05; ***p<0.01
##
## =====
##                        Dependent variable:
##                        -----
##                        s1
## -----
## s2                          1.000***
##                        (0.063)
##
## Constant                    5,325,487,495.000
##                        (3,959,430,158.000)
##
## -----
## Observations                  16
## R2                          0.947
## Adjusted R2                  0.944
## Residual Std. Error 5,157,300,357.000 (df = 14)
## F Statistic              251.972*** (df = 1; 14)
## =====
## Note:                        *p<0.1; **p<0.05; ***p<0.01
##
## =====
## TRUE
## -----

```



```
##
## #####
## # Augmented Dickey-Fuller Test Unit Root Test #
## #####
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -4.239e+10  6.862e+08  2.398e+09  7.659e+09  1.728e+10
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -9.729e+08  4.651e+09  -0.209   0.838
## z.lag.1      -2.576e-01  3.465e-01  -0.743   0.473
## z.diff.lag    2.745e-01  4.382e-01   0.626   0.544
##
## Residual standard error: 1.583e+10 on 11 degrees of freedom
## Multiple R-squared:  0.07293,    Adjusted R-squared:  -0.09562
## F-statistic: 0.4327 on 2 and 11 DF,  p-value: 0.6593
##
##
```

```

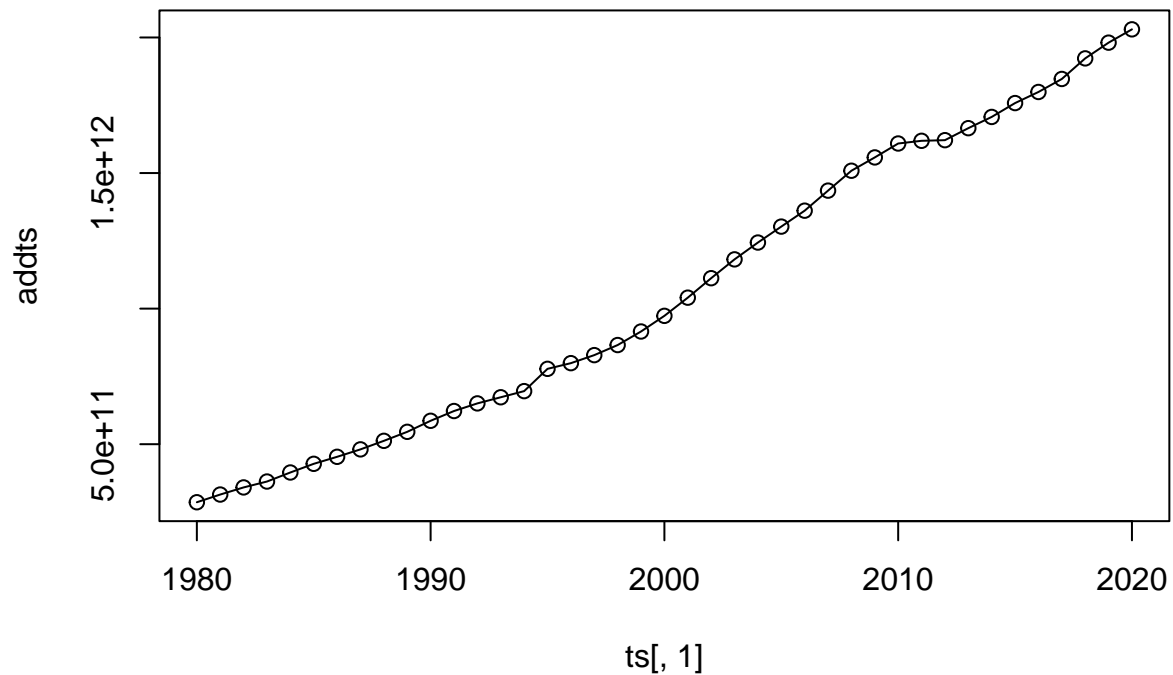
## Value of test-statistic is: -0.7435 0.4192
##
## Critical values for test statistics:
##      1pct  5pct 10pct
## tau2 -3.75 -3.00 -2.63
## phi1  7.88  5.18  4.12
##
##
## =====
##                      Dependent variable:
##                      -----
##                      s1
## -----
## lag_s1                      1.008***
##                      (0.018)
##
## Constant                      43,038,499,984.000*
##                      (21,355,529,797.000)
##
## -----
## Observations                      16
## R2                      0.996
## Adjusted R2                      0.995
## Residual Std. Error 19,746,841,918.000 (df = 14)
## F Statistic          3,152.096*** (df = 1; 14)
## =====
## Note:          *p<0.1; **p<0.05; ***p<0.01
##
## #####
## # Augmented Dickey-Fuller Test Unit Root Test #
## #####
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min        1Q      Median        3Q       Max
## -2.391e+10 -3.434e+09  4.800e+08  8.329e+09  1.863e+10
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.490e+08  3.880e+09  -0.064   0.950
## z.lag.1      -3.145e-01  2.665e-01  -1.180   0.263
## z.diff.lag    4.504e-01  3.290e-01   1.369   0.198
##
## Residual standard error: 1.385e+10 on 11 degrees of freedom
## Multiple R-squared:  0.181, Adjusted R-squared:  0.03208
## F-statistic: 1.215 on 2 and 11 DF,  p-value: 0.3335
##
##
## Value of test-statistic is: -1.1801 0.7913

```

```

##
## Critical values for test statistics:
##      1pct  5pct 10pct
## tau2 -3.75 -3.00 -2.63
## phi1  7.88  5.18  4.12
##
##
## =====
##                        Dependent variable:
##                        -----
##                        s2
## -----
## lag_s2                      1.017***
##                        (0.018)
##
## Constant                    33,117,178,138.000
##                        (21,304,826,462.000)
##
## -----
## Observations                  16
## R2                          0.996
## Adjusted R2                  0.995
## Residual Std. Error 19,892,178,980.000 (df = 14)
## F Statistic              3,106.851*** (df = 1; 14)
## =====
## Note:                      *p<0.1; **p<0.05; ***p<0.01
##
## =====
##                        Dependent variable:
##                        -----
##                        s1
## -----
## s2                          0.922***
##                        (0.081)
##
## Constant                    4,308,912,458.000
##                        (4,532,028,663.000)
##
## -----
## Observations                  16
## R2                          0.902
## Adjusted R2                  0.895
## Residual Std. Error 6,233,996,940.000 (df = 14)
## F Statistic              128.582*** (df = 1; 14)
## =====
## Note:                      *p<0.1; **p<0.05; ***p<0.01
##
## =====
## TRUE
## ----

```



```
##
## #####
## # Augmented Dickey-Fuller Test Unit Root Test #
## #####
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5.572e+10 -8.674e+09  1.043e+09  2.153e+10  2.983e+10
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.671e+08  6.884e+09   0.140  0.8908
## z.lag.1      -6.986e-01  3.600e-01  -1.941  0.0783 .
## z.diff.lag   -2.032e-02  3.002e-01  -0.068  0.9472
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.572e+10 on 11 degrees of freedom
## Multiple R-squared:  0.3562, Adjusted R-squared:  0.2391
## F-statistic: 3.043 on 2 and 11 DF,  p-value: 0.08876
```

```

##
##
## Value of test-statistic is: -1.9407 1.8976
##
## Critical values for test statistics:
##      1pct  5pct 10pct
## tau2 -3.75 -3.00 -2.63
## phi1  7.88  5.18  4.12
##
##
## =====
##                      Dependent variable:
##                      -----
##                      s1
## -----
## lag_s1                0.990***
##                      (0.036)
##
## Constant              40,159,652,434.000
##                      (27,944,128,837.000)
##
## -----
## Observations                16
## R2                          0.982
## Adjusted R2                 0.981
## Residual Std. Error 24,070,285,996.000 (df = 14)
## F Statistic            776.524*** (df = 1; 14)
## =====
## Note:                *p<0.1; **p<0.05; ***p<0.01
##
## #####
## # Augmented Dickey-Fuller Test Unit Root Test #
## #####
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -4.862e+10 -8.325e+09  9.378e+07  1.616e+10  2.844e+10
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.020e+08  6.401e+09   0.141  0.8905
## z.lag.1      -7.291e-01  3.650e-01  -1.998  0.0711 .
## z.diff.lag   -1.761e-03  3.001e-01  -0.006  0.9954
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.393e+10 on 11 degrees of freedom
## Multiple R-squared:  0.3632, Adjusted R-squared:  0.2475

```

```

## F-statistic: 3.137 on 2 and 11 DF,  p-value: 0.08353
##
##
## Value of test-statistic is: -1.9978 2.0112
##
## Critical values for test statistics:
##      1pct  5pct 10pct
## tau2 -3.75 -3.00 -2.63
## phi1  7.88  5.18  4.12
##
##
## =====
##                      Dependent variable:
##                      -----
##                      s2
## -----
## lag_s2                      0.991***
##                      (0.034)
##
## Constant                      38,847,511,824.000
##                      (26,360,021,209.000)
##
## -----
## Observations                      16
## R2                      0.984
## Adjusted R2                      0.983
## Residual Std. Error 22,264,324,356.000 (df = 14)
## F Statistic                      864.627*** (df = 1; 14)
## =====
## Note:                      *p<0.1; **p<0.05; ***p<0.01
##
## =====
##                      Dependent variable:
##                      -----
##                      s1
## -----
## s2                      1.073***
##                      (0.037)
##
## Constant                      -1,864,883,147.000
##                      (1,411,916,548.000)
##
## -----
## Observations                      16
## R2                      0.984
## Adjusted R2                      0.983
## Residual Std. Error 3,080,914,350.000 (df = 14)
## F Statistic                      845.298*** (df = 1; 14)
## =====
## Note:                      *p<0.1; **p<0.05; ***p<0.01
##
## =====
## TRUE
## ----

```

