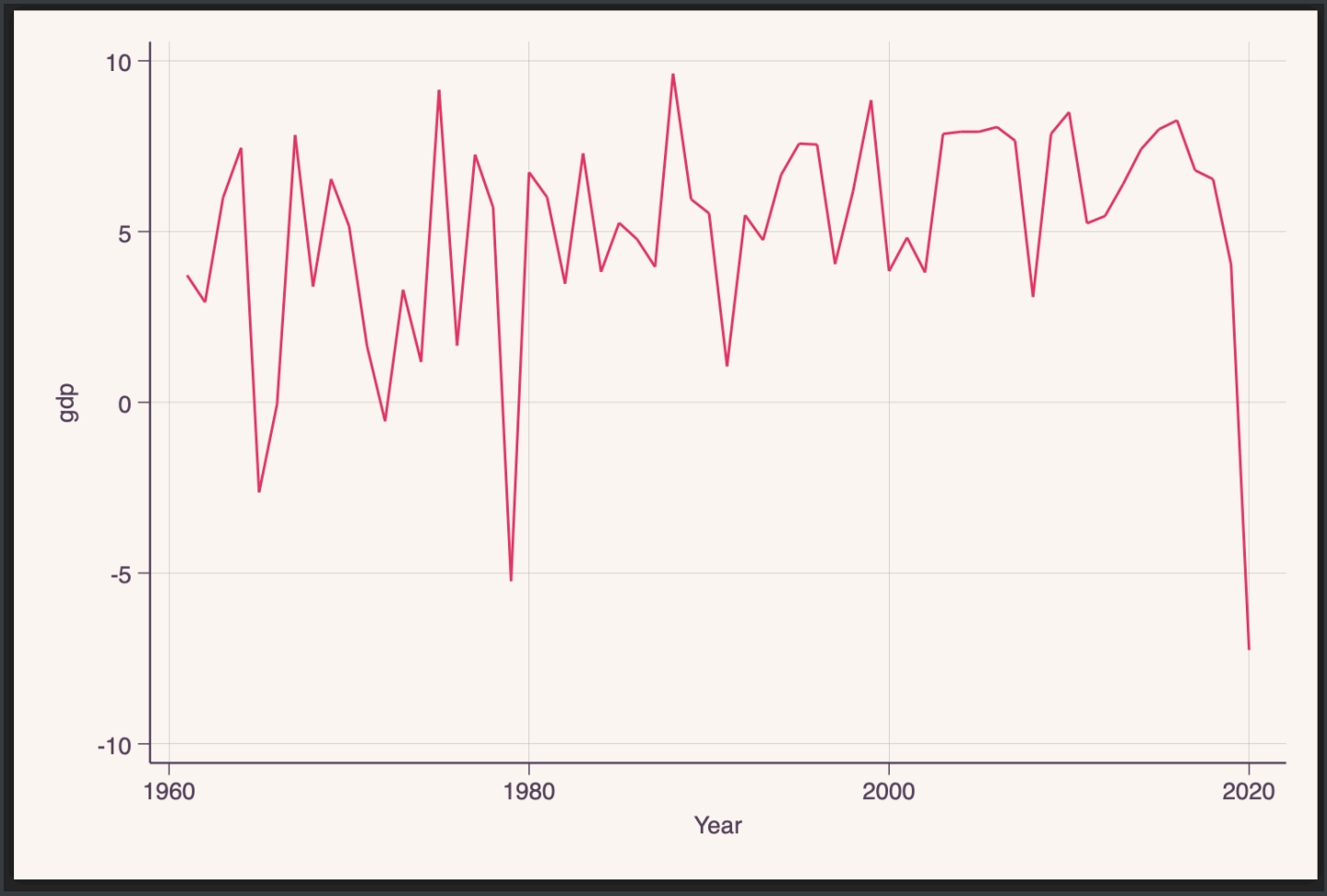
Prediction of India's GDP

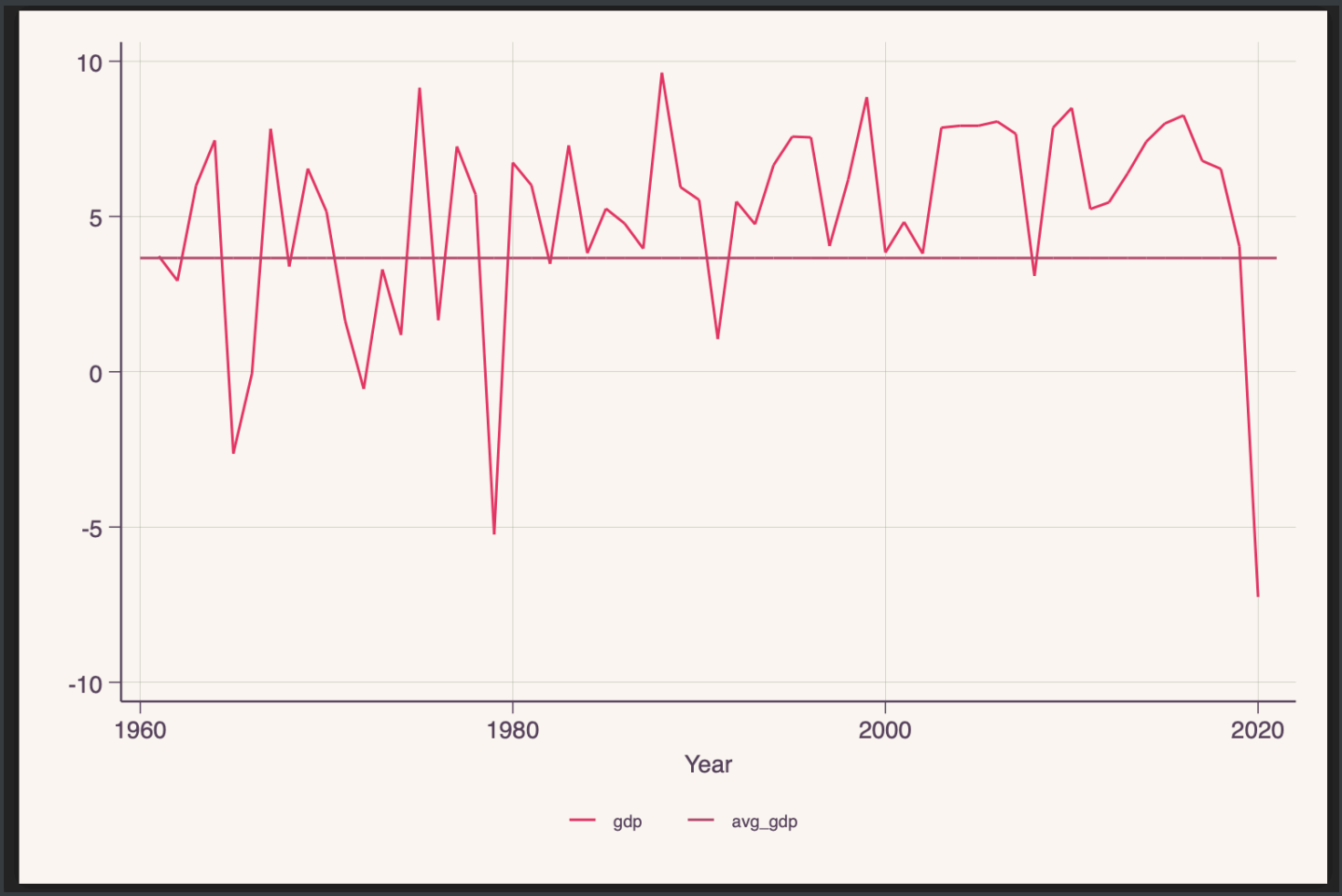
Data: World Bank

```
tsline gdp if country=="India"
```



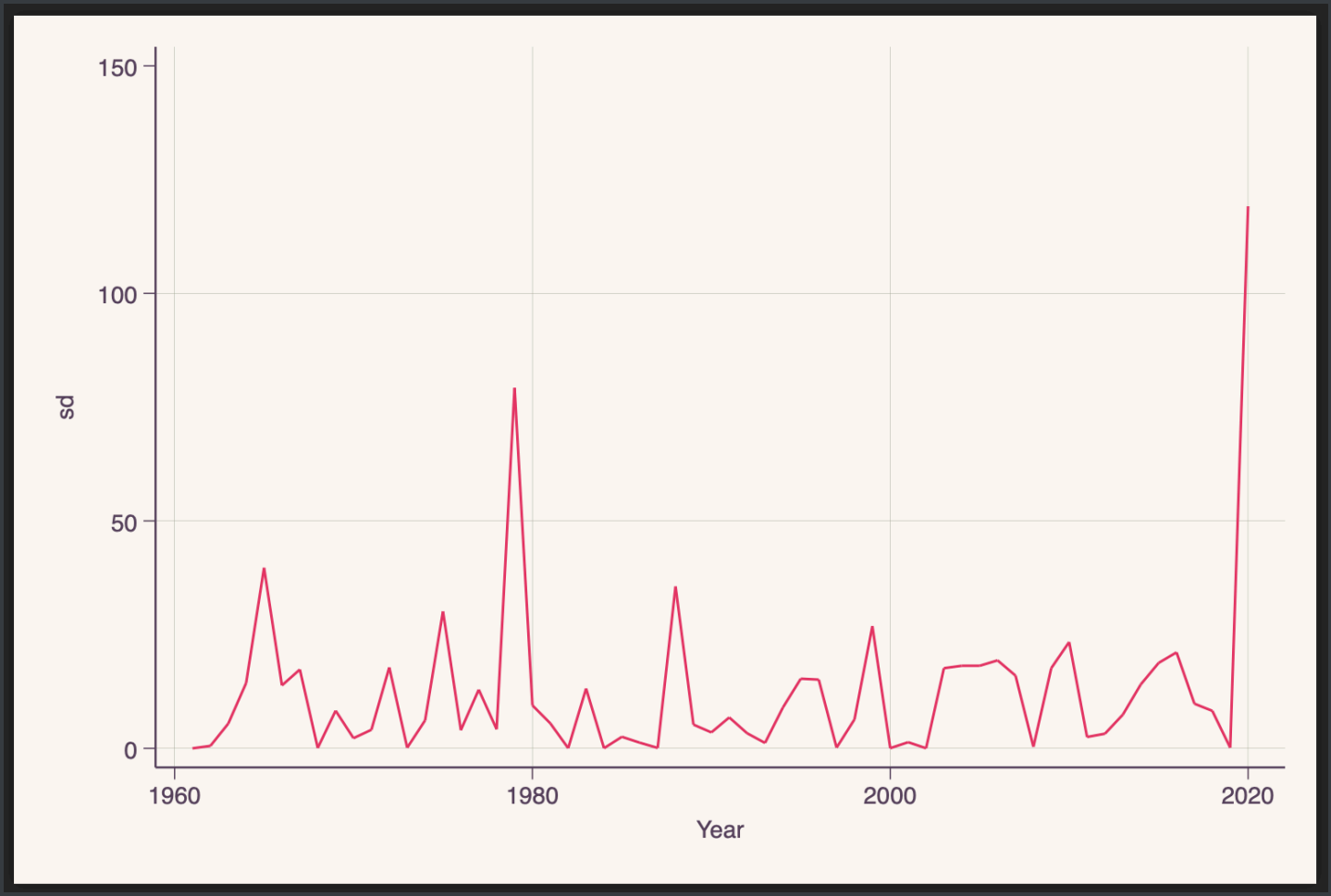
Plotting with the average GDP growth to check whether the mean of GDP growth change over time

```
egen avg_gdp = mean (gdp)
tsline gdp avg
```



Plotting with the average GDP growth to check whether the SD changed over time

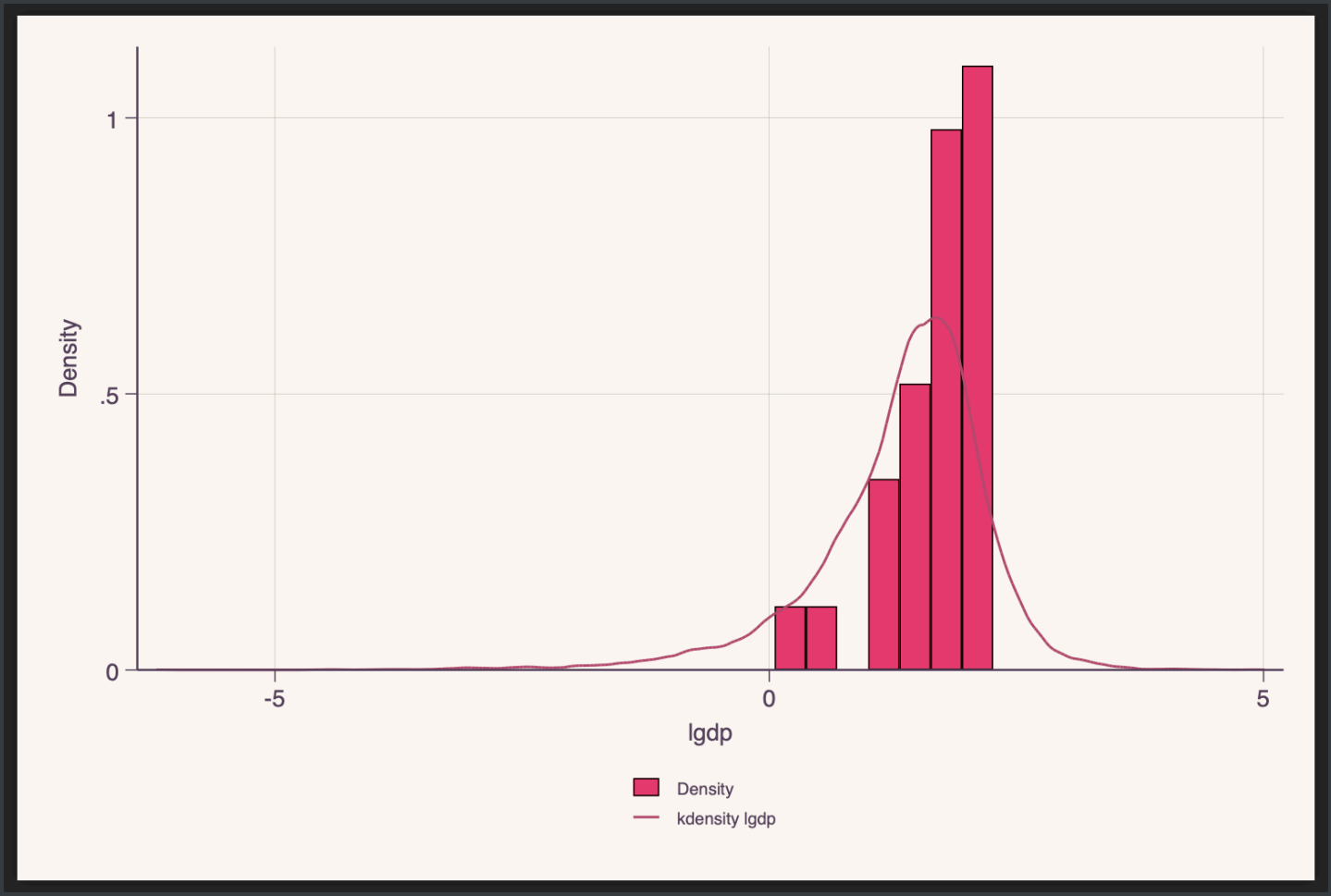
```
gen sd = (gdp - avg) ^2
tsline sd  , sch(swift_red)
```



- Substantial variation from the mean during the first COVID year since early 1980s.

Plotting the skewness

```
histogram gdp, frequency
histogram gdp, addplot (kdensity gdp) legend
```



Highly skewed i.e. median>mean. A quick normality test based on skewness and kurtosis

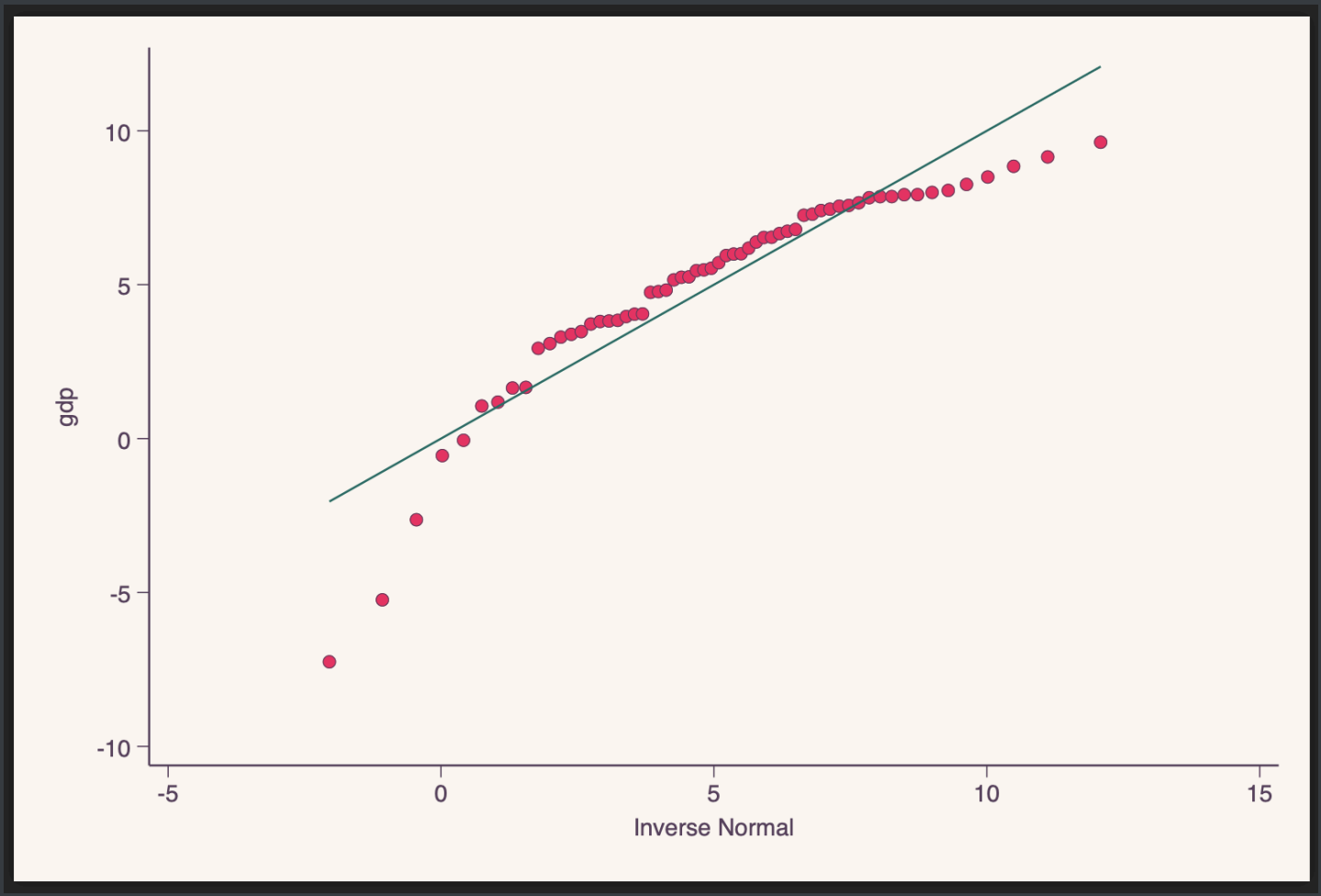
```
. sktest gdp

Skewness and kurtosis tests for normality
                                                     ----- Joint test
-----
    Variable |       Obs   Pr(skewness)   Pr(kurtosis)   Adj chi2(2)
Prob>chi2
-------------+-------------------------------------------------------
-----
         gdp |        60         0.0000         0.0024         20.34
0.0000
```

P being <0.05, we can reject the hypothesis that gdp is normally distributed.

Plotting the quantiles of gdp (red dots) against the quantiles of the normal distribution (blue line)

```
qnorm gdp if cn==112, sch(swift_red)
```



Checking the mean vs mean

```
. reg gdp   ,   cformat(%9.2f)
```

```
      Source |       SS           df       MS      Number of obs   =
60
-------------+----------------------------------   F(0, 59)        =
0.00
       Model |           0         0           .   Prob > F        =
  .
    Residual |  646.434037        59  10.9565091   R-squared       =
0.0000
-------------+----------------------------------   Adj R-squared   =
0.0000
       Total |  646.434037        59  10.9565091   Root MSE        =
3.3101

------------------------------------------------------------------------------
         gdp |      Coef.   Std. Err.      t    P>|t|     [95% Conf.
Interval]
-------------+----------------------------------------------------------------
       _cons |       5.02       0.43    11.75   0.000         4.17
5.88
```

Quantile reg

```
. qreg gdp  ,  cformat(%9.2f)
Iteration  1:  WLS sum of weighted deviations =  71.801493

Iteration  1: sum of abs. weighted deviations =  71.662241
note:  alternate solutions exist
Iteration  2: sum of abs. weighted deviations =  70.900962
```

```
Median regression                                   Number of obs =
  60
  Raw sum of deviations 70.90096 (about 5.5334544)
  Min sum of deviations 70.90096                    Pseudo R2     =
0.0000

------------------------------------------------------------------------------
         gdp |      Coef.   Std. Err.      t    P>|t|     [95% Conf.
Interval]
-------------+----------------------------------------------------------------
       _cons |       5.53       0.47    11.66   0.000         4.58
6.48
------------------------------------------------------------------------------
```

The constant value for regression with the mean (OLS) is smaller than that of the regression with median (quantile regression)

Regressing GDP on its lag

```
reg gdp l.gdp  , cformat(%9.2f)

      Source |       SS           df       MS      Number of obs   =
59
-------------+----------------------------------   F(1, 57)        =
0.33
       Model |  3.69969014         1  3.69969014   Prob > F        =
0.5685
```

```
    Residual |  641.021768        57  11.2459959   R-squared       =
0.0057
-------------+----------------------------------   Adj R-squared   =
-0.0117
       Total |  644.721458        58  11.1158872   Root MSE        =
3.3535

------------------------------------------------------------------------------
         gdp |      Coef.   Std. Err.      t    P>|t|     [95% Conf.
Interval]
-------------+----------------------------------------------------------------
         gdp |
         L1. |       0.09       0.15     0.57   0.569        -0.22
0.39
             |
       _cons |       4.59       0.90     5.09   0.000         2.78
6.40


. eststo fcast
```

Setting additional observation for prediction of GDP till 2030.

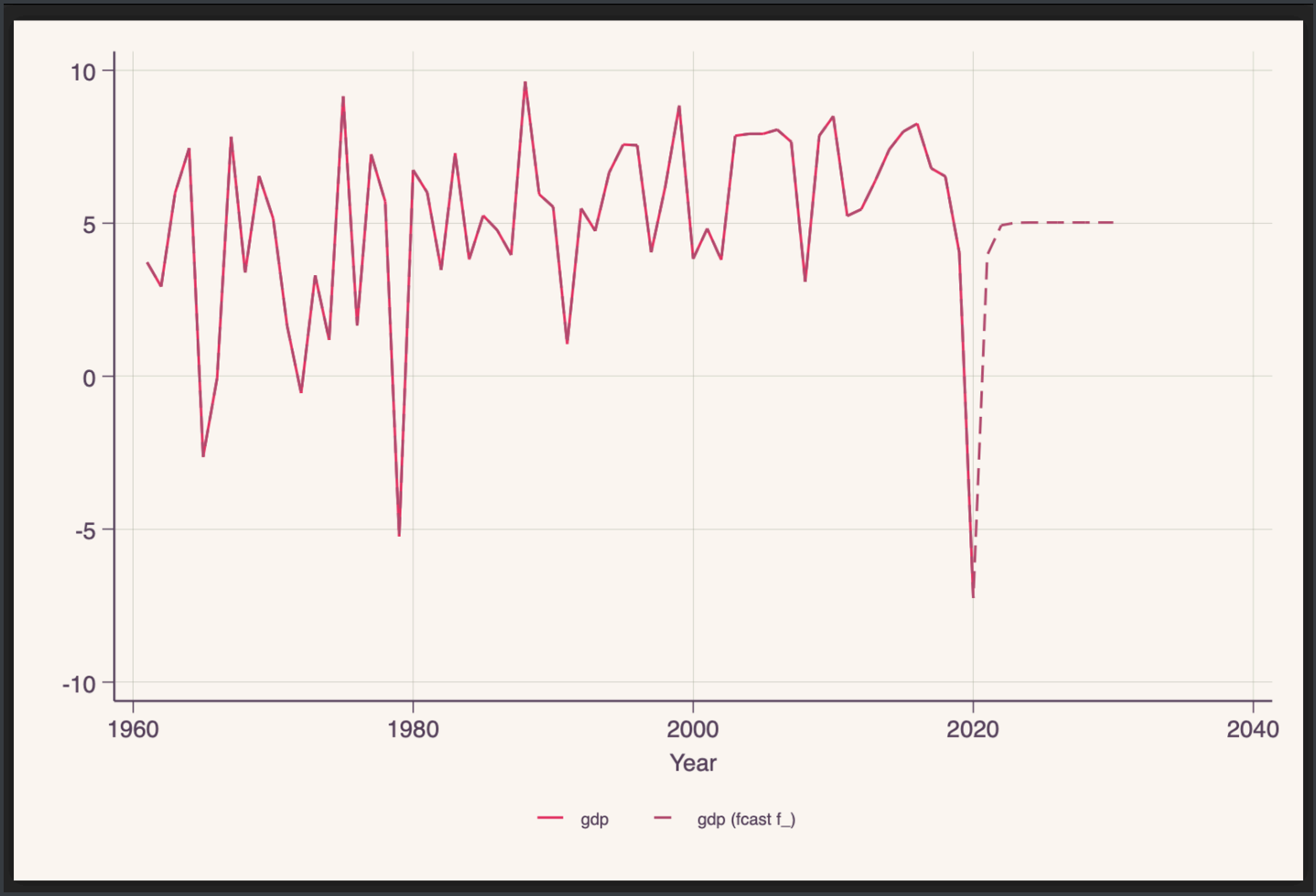
```
set obs 63
replace year = 2022 in 63
set obs 64
replace year = 2023 in 64
set obs 65
```

```
replace year = 2024 in 65
set obs 66
replace year = 2025 in 66
set obs 67
replace year = 2026 in 67
set obs 68
replace year = 2027 in 68
set obs 69
replace year = 2027 in 69
set obs 70
replace year = 2028 in 70
set obs 71
replace year = 2029 in 71
set obs 72
replace year = 2030 in 72
```

Estimation of GDP growth from 2021-2030.

```
forecast create fcast, replace
forecast estimates fcast
forecast solve, begin (2021)
```

Plotting the forecast values


10
5
0
-5
-10
1960
1980
2000
2020
2040
Year
gdp
gdp (fcast f_)