## Training sample regressions

Training sample begins in 1970-03-31 and ends in 2014-01-01. We run regressions of state and local tax revenues (by revenue source) using annual data over the training sample, then predict annual data for the out of sample forecasts. Next we smooth those out of sample forecasts into quarterly levels (at an annual rate).

The tables below report the regression results for the given specification and then display the figures of the forecast alongside the realized values of the tax revenue components. The tax components are named as follows:

- gsrpt = Personal income taxes
- gsrpri = Production & Import taxes
- gsrcp = corporate taxes
- gsrs = Payroll taxes

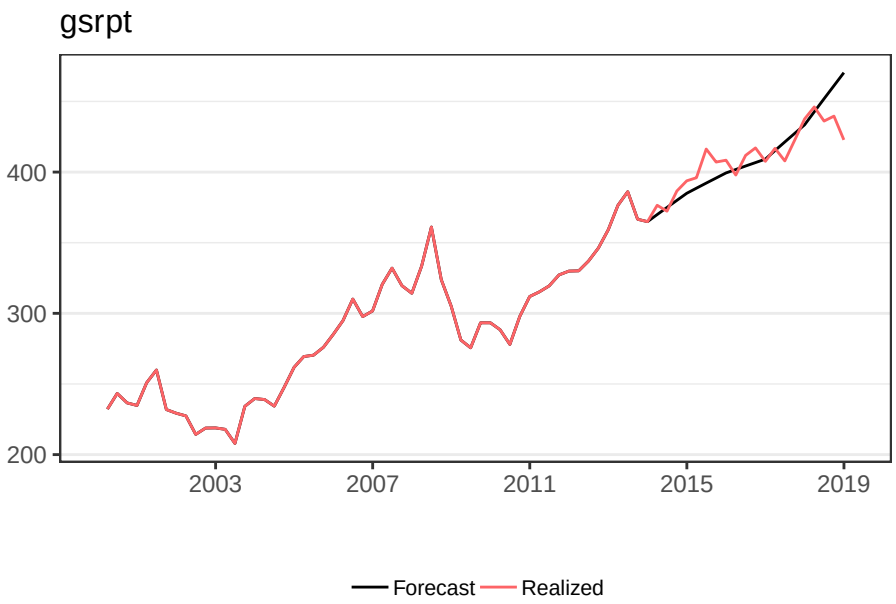
All values are in nominal billions of dollars, at seasonally-adjusted annual rates.

## Nominal level regressions (with linear time trend)

Table 1: Nominal levels

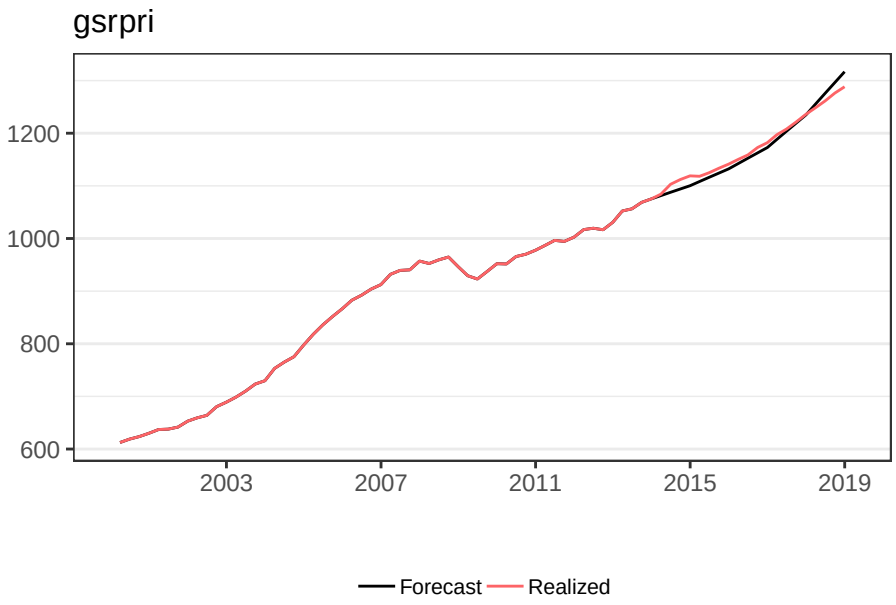
| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | gsrpt | gsrpri | gsrcp | gsrs |
| | (1) | (2) | (3) | (4) |
| t | $-19.167^{***}$ | $-16.637^{*}$ | $-12.124^{***}$ | $7.526^{***}$ |
| | (4.937) | (7.944) | (2.624) | (2.001) |
| gdp | $0.034^{***}$ | $0.060^{***}$ | $0.026^{***}$ | $-0.008^{*}$ |
| | (0.010) | (0.017) | (0.005) | (0.004) |
| gdp_l1 | $0.046^{**}$ | 0.005 | $-0.015^{*}$ | $-0.001$ |
| | (0.014) | (0.023) | (0.008) | (0.006) |
| gdp_l2 | $-0.019^{*}$ | 0.013 | 0.009 | $-0.007$ |
| | (0.010) | (0.016) | (0.005) | (0.004) |
| hpx | 0.465 | 1.128 | $0.547^{**}$ | 0.222 |
| | (0.384) | (0.618) | (0.204) | (0.156) |
| hpx_l1 | $-1.217^{**}$ | $-0.487$ | $-0.521^{*}$ | 0.014 |
| | (0.489) | (0.787) | (0.260) | (0.198) |
| hpx_l3 | 0.456 | 0.333 | 0.115 | 0.038 |
| | (0.314) | (0.505) | (0.167) | (0.127) |
| hpx_l5 | $-0.017$ | $0.760^{*}$ | $0.333^{**}$ | $-0.023$ |
| | (0.254) | (0.409) | (0.135) | (0.103) |
| Constant | $240.346^{***}$ | 145.490 | $147.104^{***}$ | $-95.246^{***}$ |
| | (61.826) | (99.485) | (32.868) | (25.064) |
| Observations | 18 | 18 | 18 | 18 |
| $R^2$ | 0.997 | 0.999 | 0.970 | 0.917 |
| Adjusted $R^2$ | 0.994 | 0.998 | 0.943 | 0.843 |
| *Note:* | | | | $^{*}$p<0.1; $^{**}$p<0.05; $^{***}$p<0.01 |

[[1]]



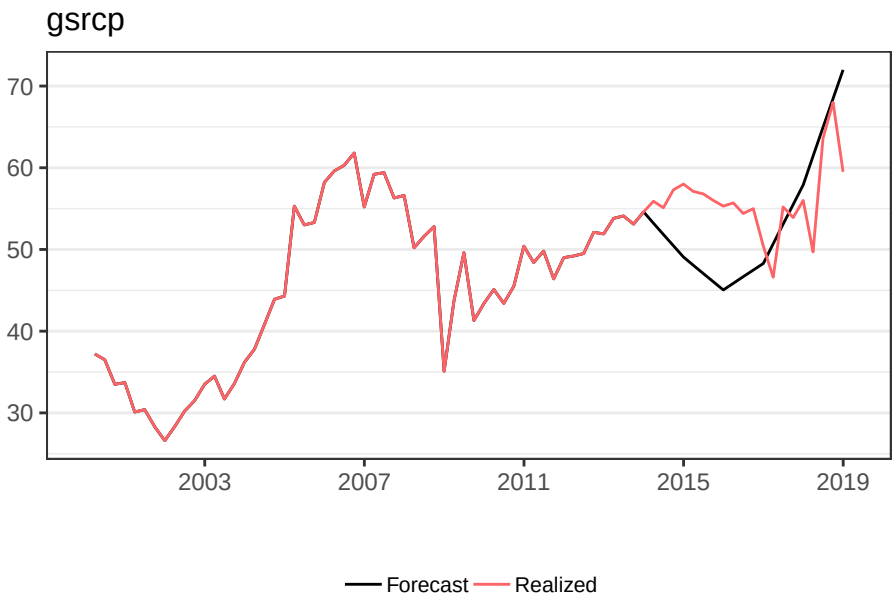

RMSD of forecast = 16.21

[[2]]



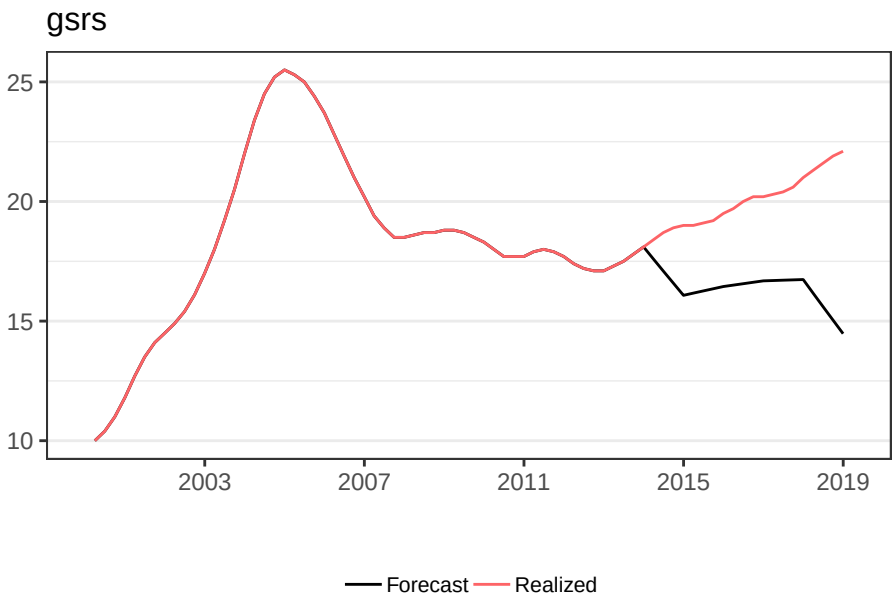

RMSD of forecast = 13.31

[[3]]




RMSD of forecast = 7.17

[[4]]



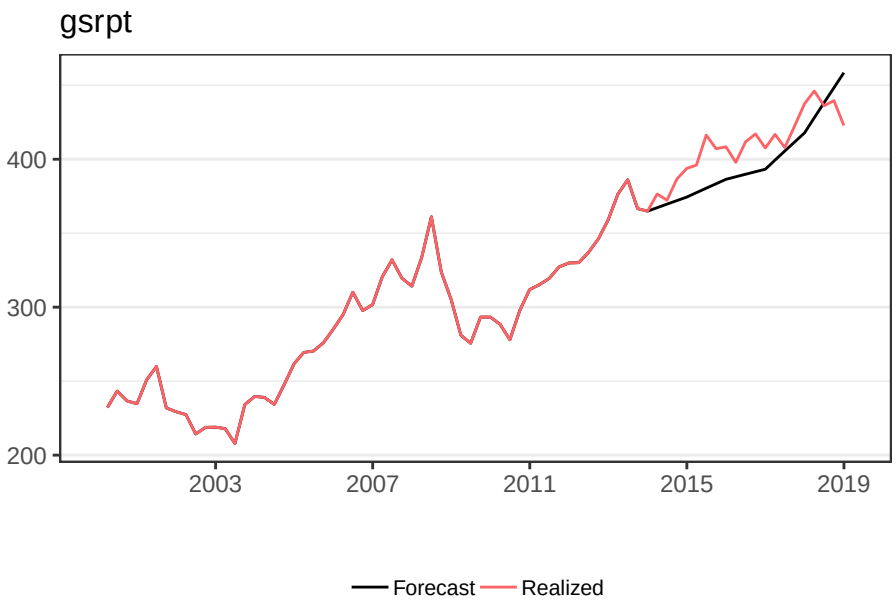

RMSD of forecast = 4.31

## Differenced levels regressions

Table 2: Differenced levels

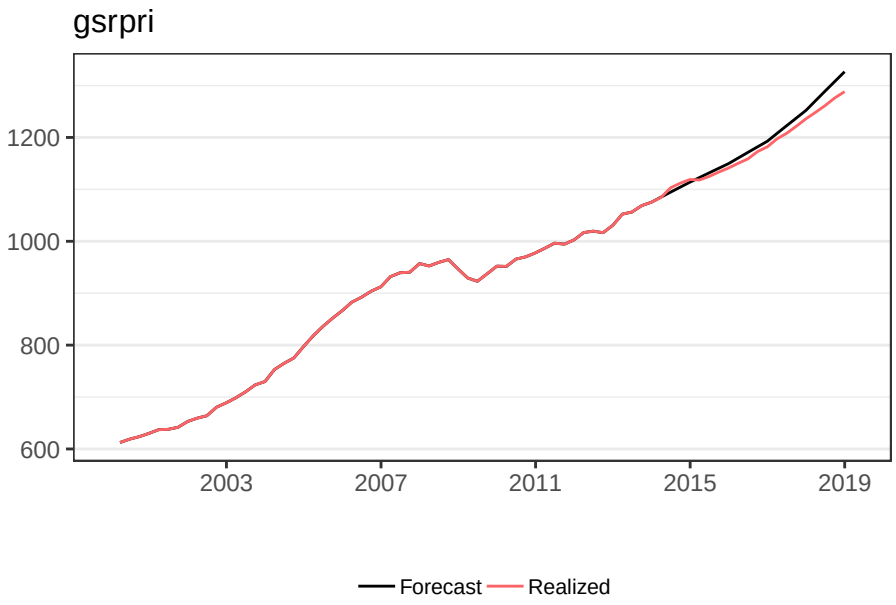
| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | gsrpt_d | gsrpri_d | gsrcp_d | gsrs_d |
| | (1) | (2) | (3) | (4) |
| gdp_d | $0.036^{***}$ | $0.050^{***}$ | $0.024^{***}$ | $-0.007^{*}$ |
| | (0.011) | (0.015) | (0.007) | (0.004) |
| gdp_d_l1 | $0.045^{***}$ | 0.005 | $-0.018^{**}$ | 0.001 |
| | (0.012) | (0.017) | (0.008) | (0.004) |
| gdp_d_l2 | $-0.012$ | 0.008 | $0.011^{*}$ | $-0.007^{*}$ |
| | (0.009) | (0.013) | (0.006) | (0.003) |
| hpx_d | 0.628 | $0.956^{*}$ | $0.451^{*}$ | 0.175 |
| | (0.368) | (0.509) | (0.236) | (0.128) |
| hpx_d_l1 | $-1.388^{**}$ | $-0.205$ | $-0.345$ | $-0.011$ |
| | (0.466) | (0.646) | (0.300) | (0.163) |
| hpx_d_l3 | 0.372 | 0.262 | $-0.016$ | 0.069 |
| | (0.322) | (0.447) | (0.207) | (0.112) |
| hpx_d_l5 | 0.317 | 0.408 | $0.305^{*}$ | $-0.084$ |
| | (0.259) | (0.359) | (0.166) | (0.090) |
| Constant | $-25.548^{***}$ | $-6.883$ | $-9.847^{*}$ | $6.854^{**}$ |
| | (7.512) | (10.407) | (4.826) | (2.618) |
| Observations | 17 | 17 | 17 | 17 |
| $R^2$ | 0.891 | 0.910 | 0.876 | 0.538 |
| Adjusted $R^2$ | 0.806 | 0.839 | 0.780 | 0.178 |
| *Note:* | | | | $^{*}$p<0.1; $^{**}$p<0.05; $^{***}$p<0.01 |

[[1]]




RMSD of forecast = 19.24

[[2]]

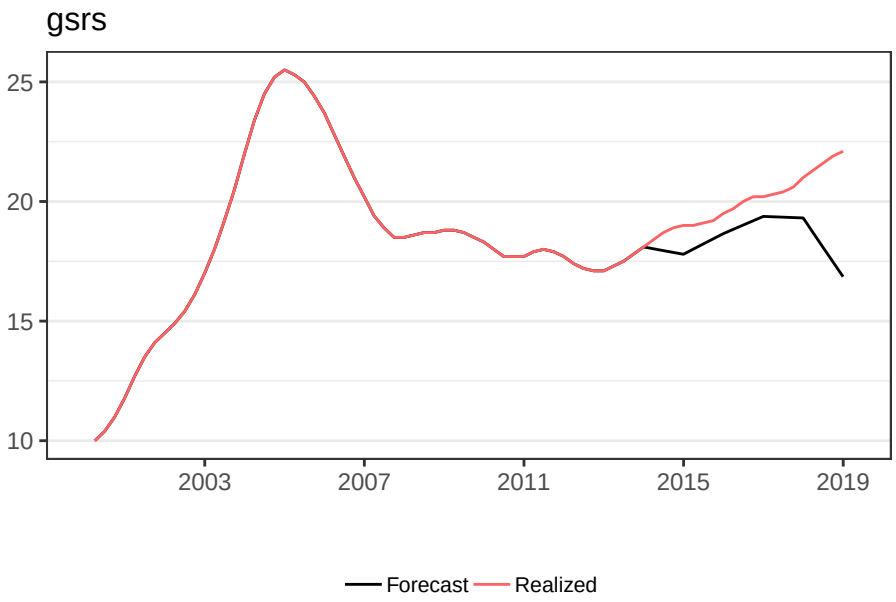



RMSD of forecast = 17.66

[[3]]


RMSD of forecast = 6.17

[[4]]

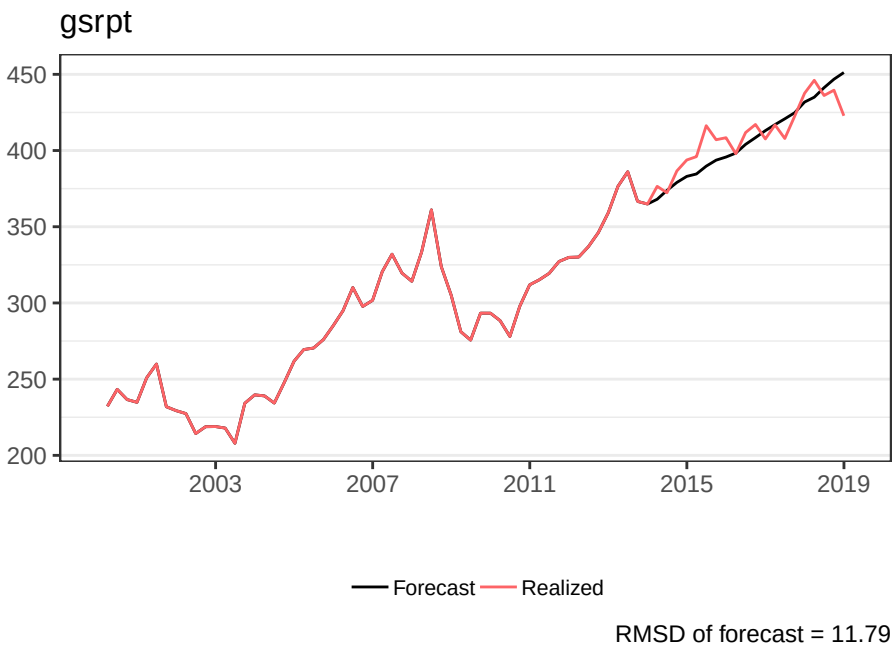



RMSD of forecast = 2.33

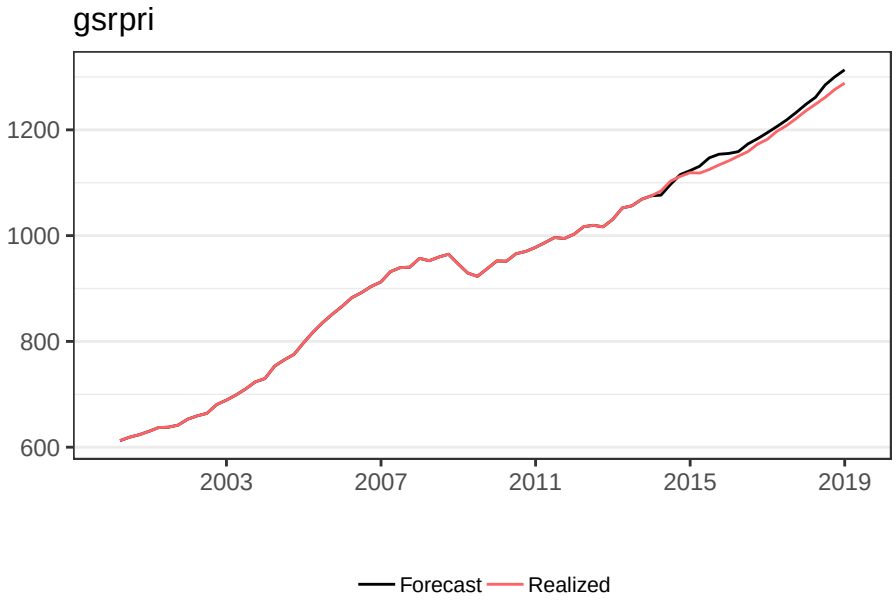
### Assuming constant tax rate

Personal income taxes grow with nominal private consumption. All other taxes grow with nominal GDP.

[[1]]

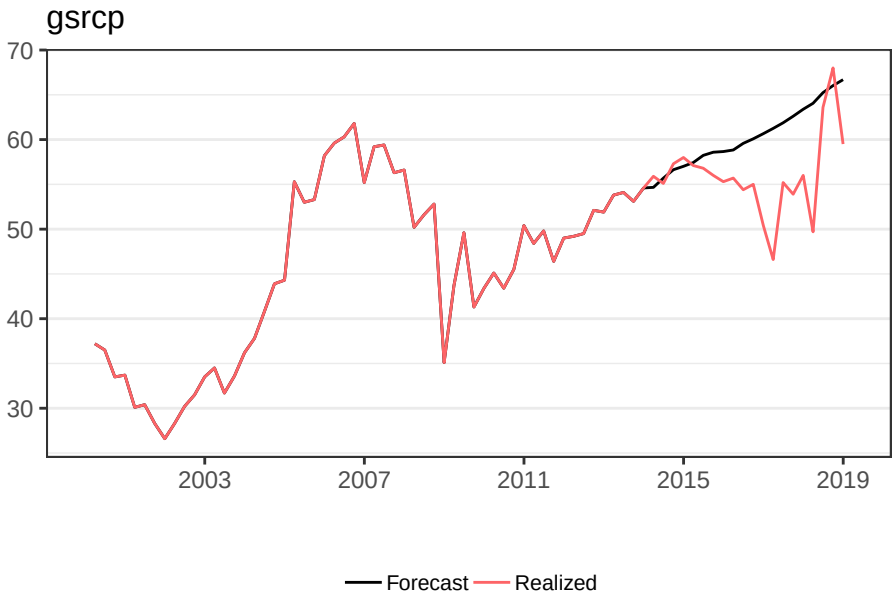



[[2]]



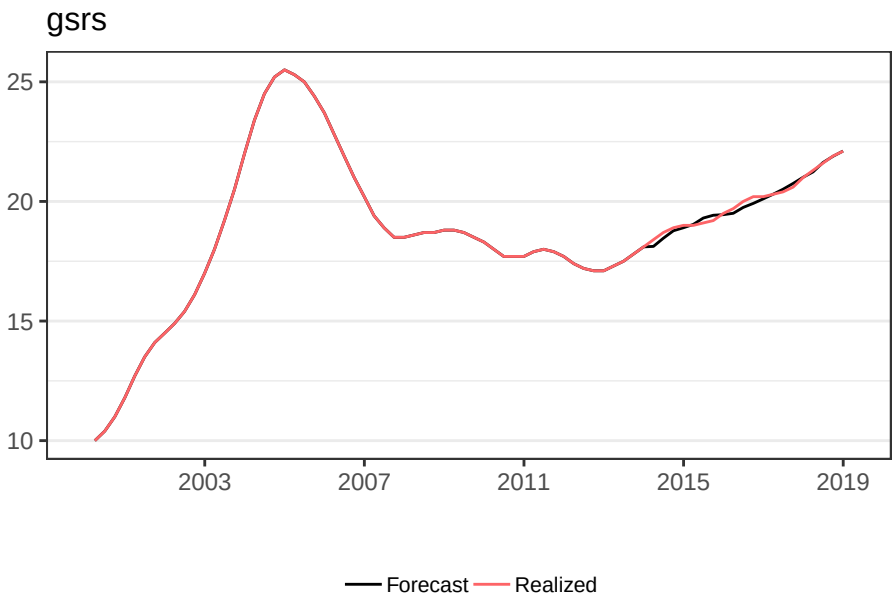

RMSD of forecast = 15.08

[[3]]




RMSD of forecast = 6.34

[[4]]




RMSD of forecast = 0.15