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Time Series and Forecasting (a.a. 2023/24)

Assignment no. 2

Slide 2

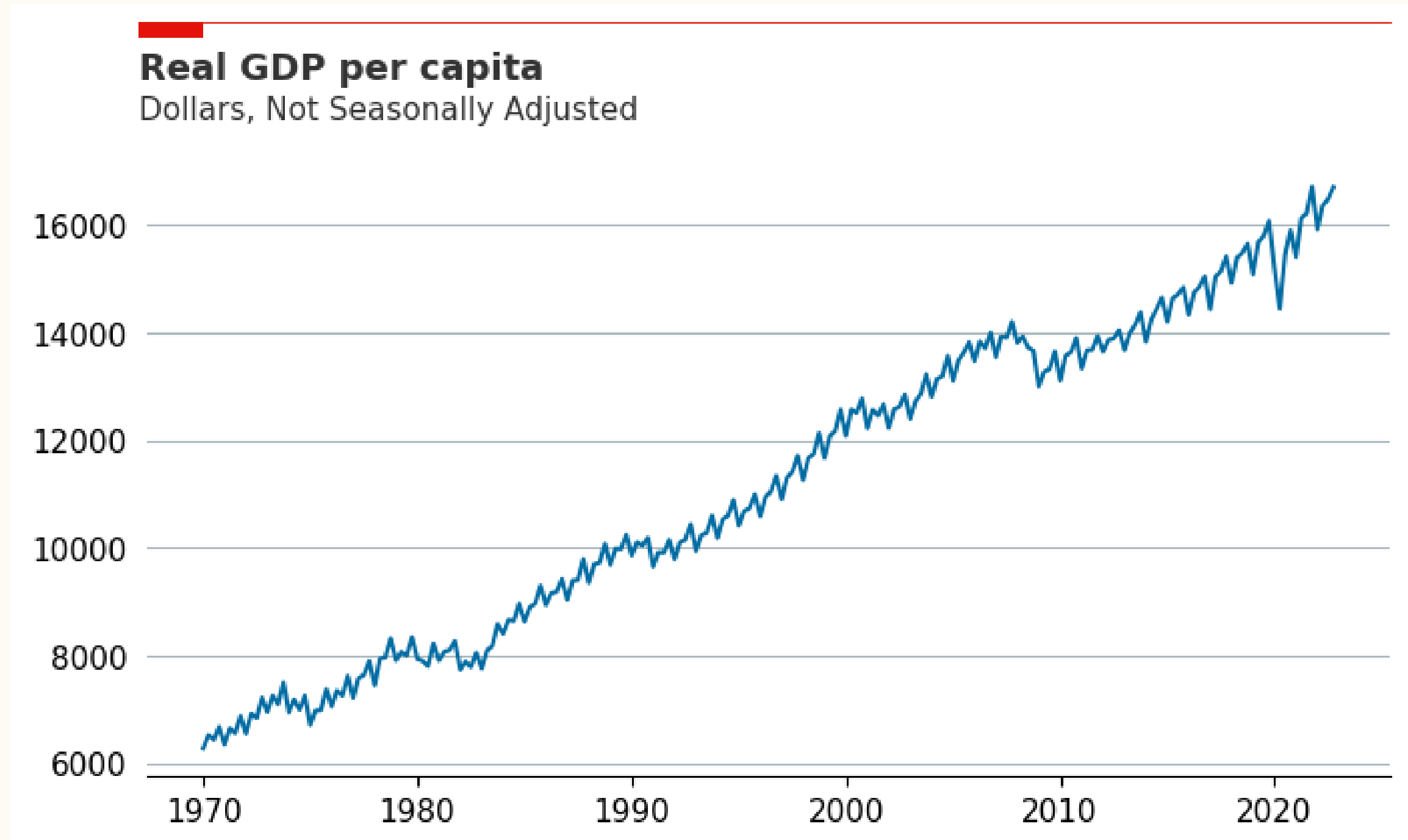
The dataset examined contains three historical series collected from FRED, with values ranging from the first quarter 1947 to the second quarter 2023.

- **NA000334Q**, GDP in million of dollars in the USA , not seasonally adjusted
- **GDPDEF**, GDP implicit price deflator, Base Index: 2017 = 100, seasonally adjusted
- **B230RC0Q173SBEA**, Population in the USA in thousands of people, not seasonally adjusted

	GDP	Prc_def	Pop
count	306	306	306
mean	1.755.796	51,41	241.838
std	1.806.439	32,89	56.994
min	58.497	11,14	143.143
25%	200.021	16,85	195.892
50%	1.067.039	50,52	237.925
75%	3.022.889	78,67	292.716
max	6.802.375	121,77	335.019

Slide 3

From this plot we can observe an increasing linear trend and a strong seasonality; there also seems to be the presence of cycles, which could be better identified through further analyses.

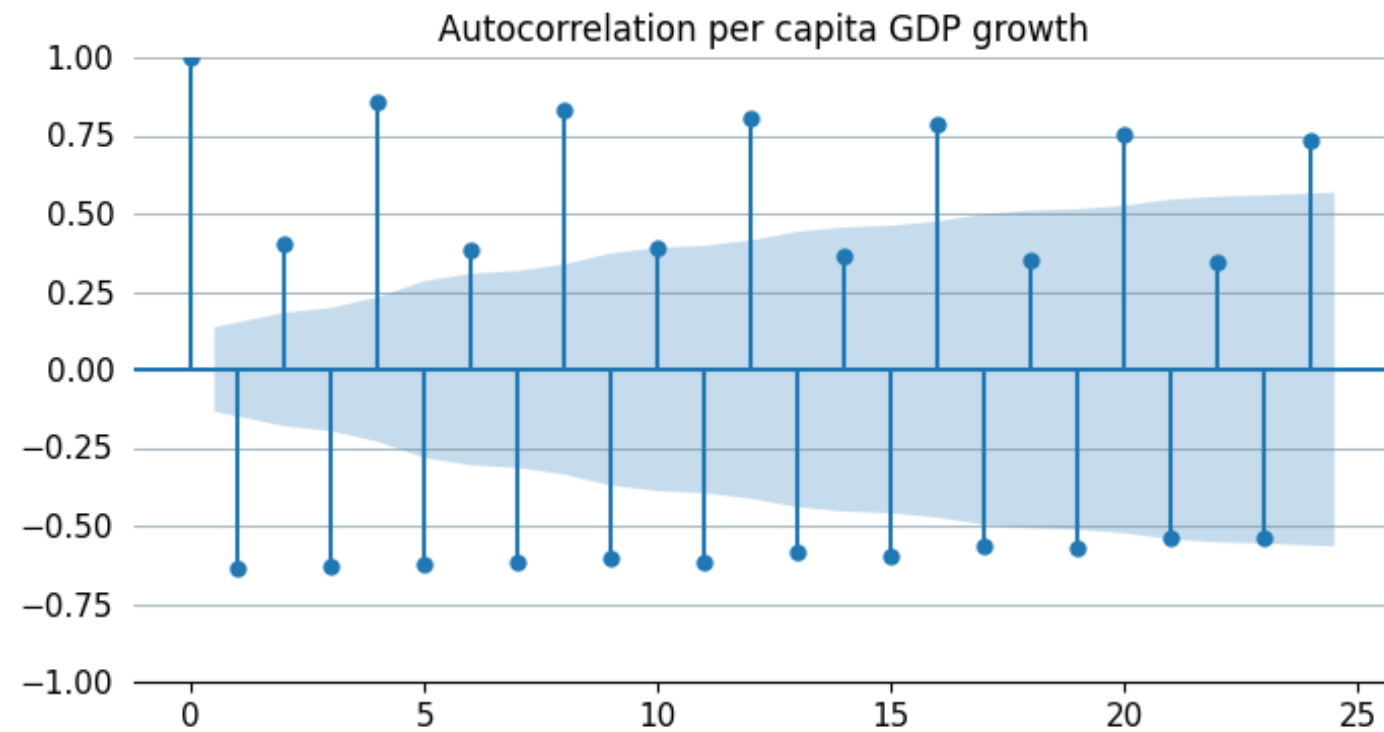


Slide 4

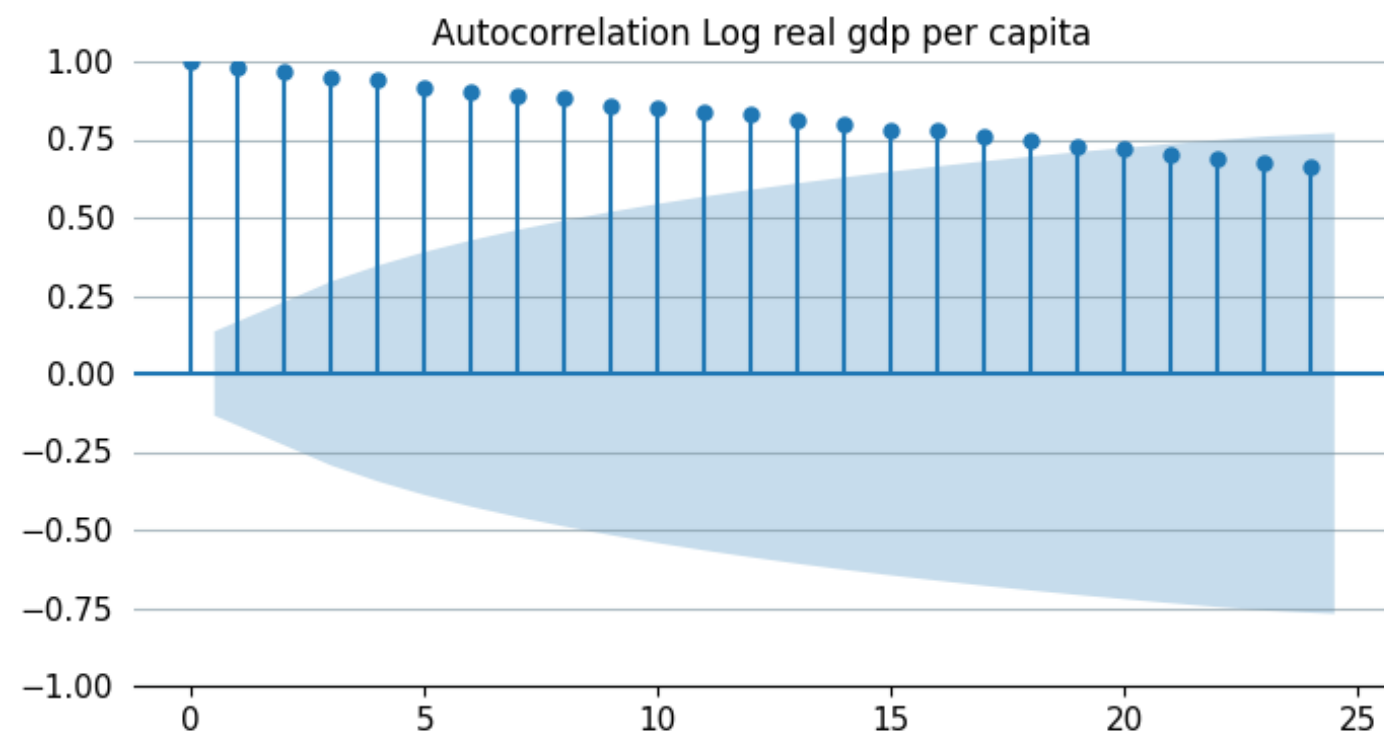
Sample average of annualized per capita GDP =
1.855%

This results has been obtained using the
observations from “01-01-1970” to “01-10-2022”

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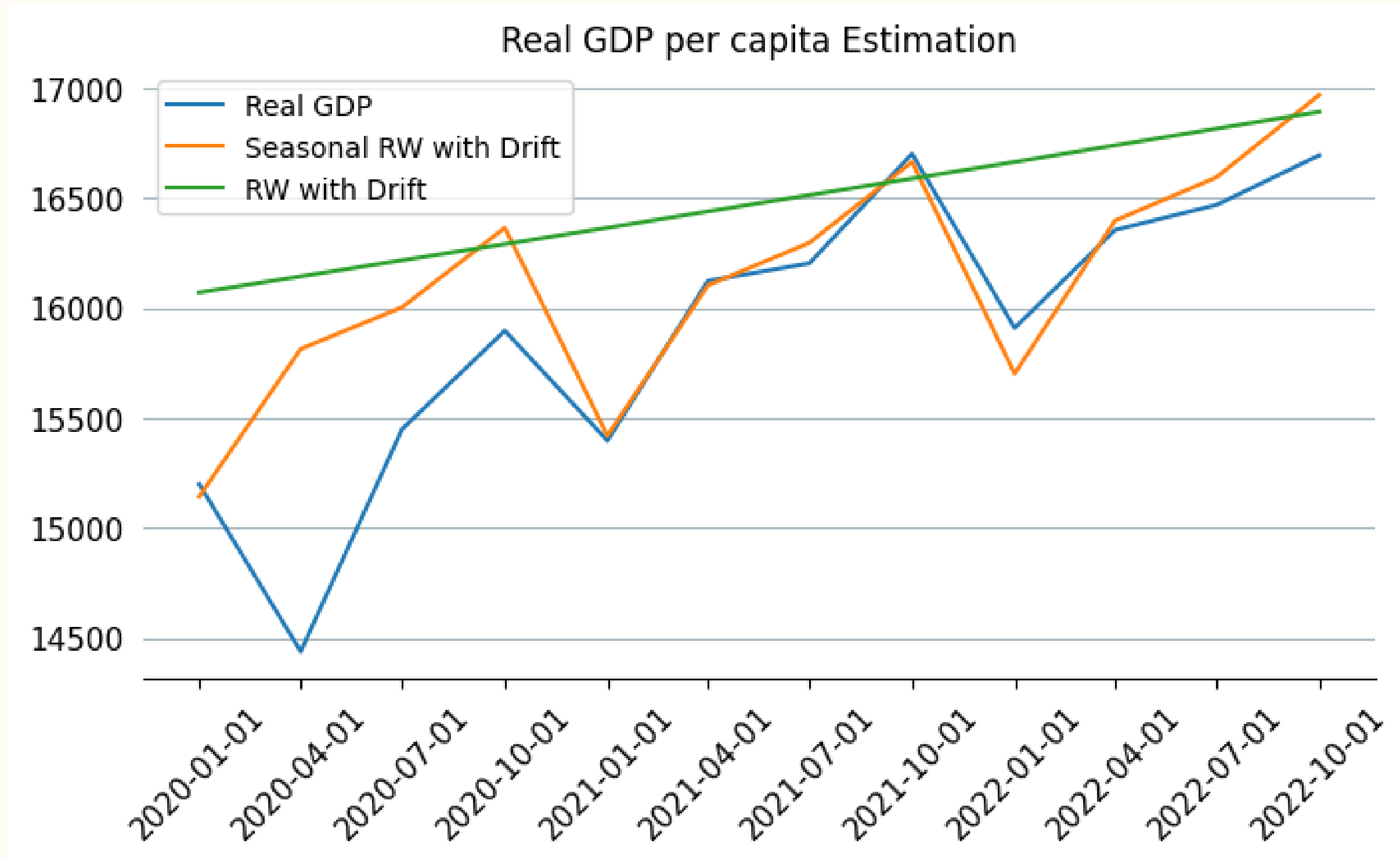


The plot of the sample autocorrelation for the sample GDP growth per capita reflects the seasonality present in the data. The correlation is the highest for lags multiple of four, representing values in the same quarter of precedent years. We also notice that the correlation with lag of 2 quarters (and multiples) is positive, while for lag of 1 and 3 quarters (and multiples) is negative



With log-values the plot, what emerges the most is the decreasing pattern of ACF function, the further back in time we go, the less the values taken into account will be correlated with the present.

Slide 6



Slide 7

RMSE:

- RW with Drift: 732.08
- Seasonal RW with Drift: 462.50

Seasonal RW with Drift has lower RMSE because it captures the seasonal trend present in the series and it is able, for this reason, to be more accurate in the prediction.