3-14-2019
QMBU450-HW2
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Multivariate Linear Regression in Python

In the linear regression homework, my aim was to study the independent variables retrieved from World Bank api (i) *working age population percentage*, (ii) *labor force participation rate*, (iii) *inflation*, and (iv) *percentage population of people that do not receive social protection* over the dependent variable *birth rate*.

My hypothesis was that there will be significant prediction of birth rate by the predictor variables mentioned above. First intuition behind the hypothesis was that both working age population percentage and labor force participation rate would affect the dependent variable in a positive manner as they mean that the economy is growing and thus wealth level is increasing, while second intuition implied that inflation and percentage of people who do not receive social protection would affect birth rate negatively as they mean overall life quality is decreasing. Lastly, I hold children population percentage as the control variable since it had a very strong correlation with birth rate as expected (98.75 per cent), in addition to the constant variable.

The model results, as opposite to the hypothesis, showed that labor force participation rate positively impacted the birth rate and an increase in working age population percentage actually decreased the outcome, while other two study variables - inflation and population that do not receive social protection did not have any significance over the variable of interest. Below is the regression table for control and independent variables and next pages include separate scatter plots of those with respect to birth rate.

	Estimate	Std. Error	Lower	Upper
(Constant)	3.098204148	3.936117978	-3.589760288	9.786168584
0_control_children_population_percentage	0.785095333	0.046854404	0.705483749	0.864706917
1_working_age_population_percentage	-18.43579751	6.357319014	-29.23769006	-7.633904954
2_labor_force_participation_rate	3.38416499	1.835958029	0.264639084	6.503690896
3_inflation	0.039281277	0.035190438	-0.020511748	0.099074301
4_population_not_rec_social_protection	-0.016635825	0.006063682	-0.026938791	-0.006332859

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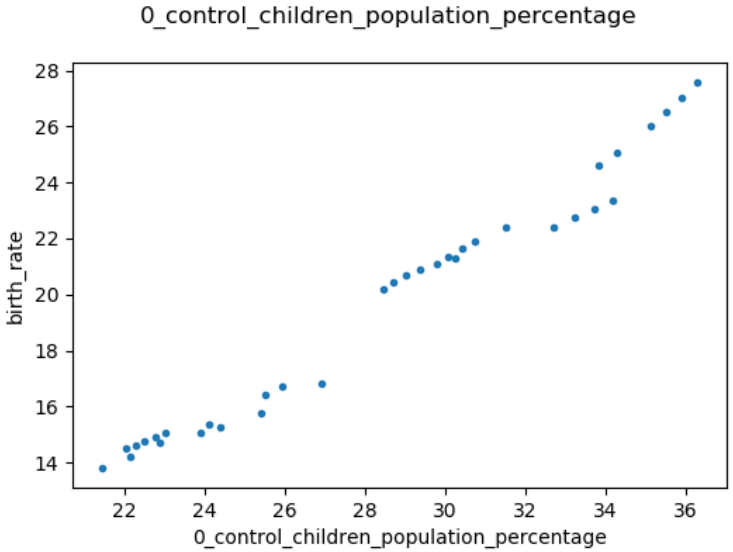

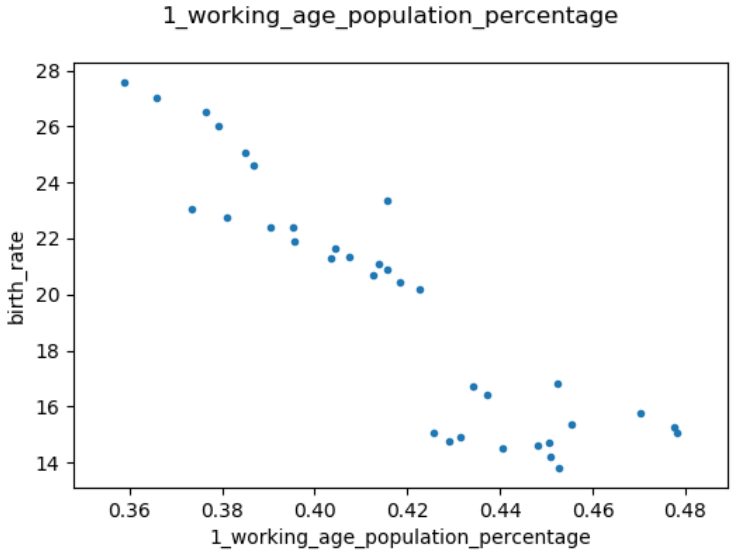

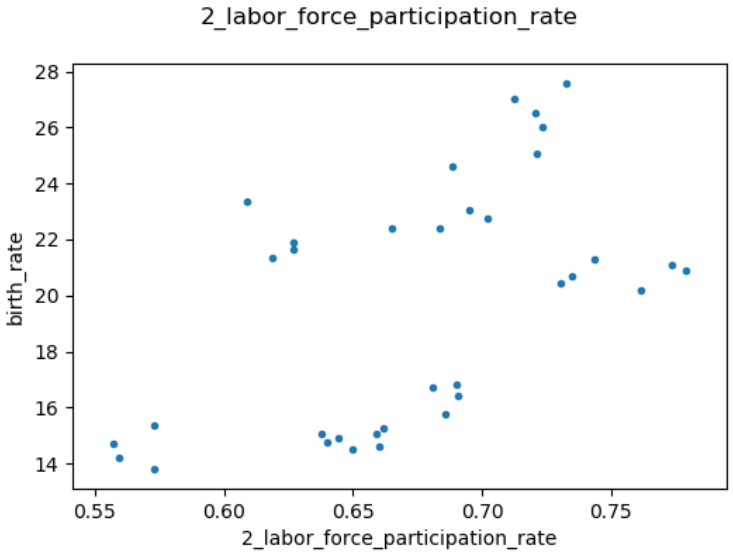

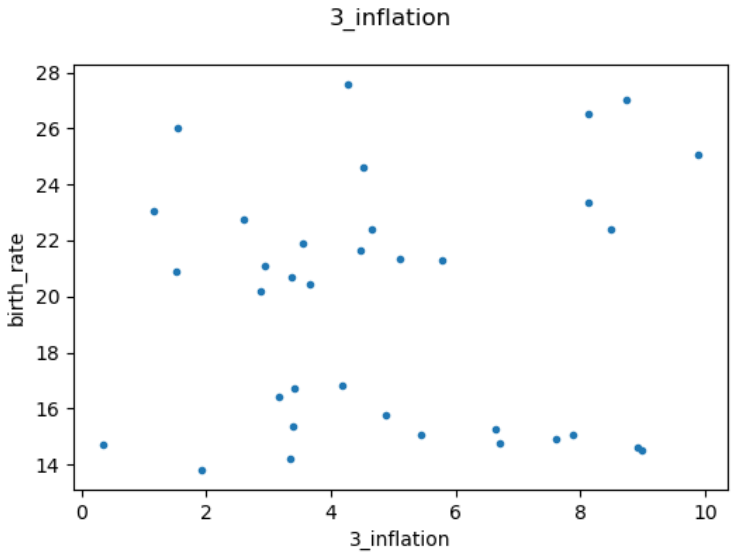

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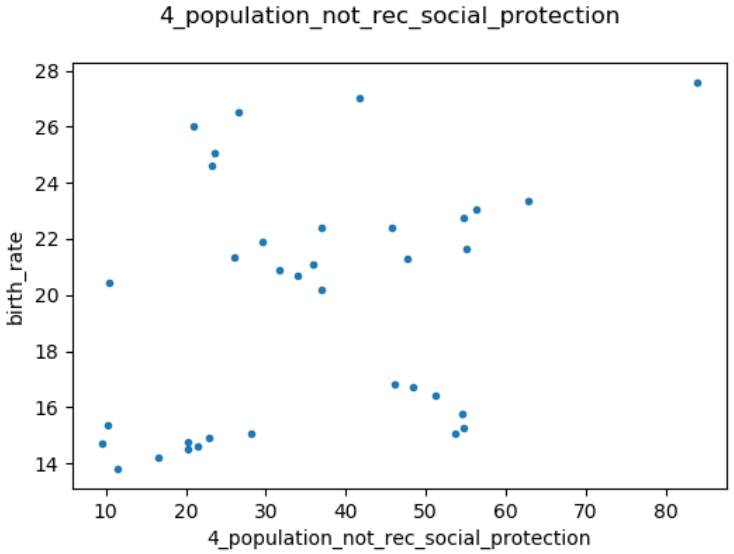

y:

```
array([27.584, 16.832, 15.339, 27.045, 23.339, 26.515, 23.036, 22.383,
       15.039, 21.278, 25.997, 14.895, 15.749, 21.072, 22.731, 14.699,
       14.757, 22.422, 21.898, 20.876, 25.039, 14.623, 15.269, 21.631,
       16.727, 20.673, 14.231, 14.495, 15.06 , 21.352, 24.612, 20.452,
       16.393, 20.203, 13.797])
```

```
y_hat:
array([26.20543174, 17.60948732, 15.53600573, 26.59478499, 23.59689374,
       26.357365  , 24.14209284, 22.5033958 , 15.32702045, 21.3507049 ,
       25.83422089, 15.1097874 , 15.98084231, 20.98476972, 23.73559776,
       14.48277999, 14.94731743, 23.30815408, 21.70115481, 20.65864418,
       25.34311722, 14.54660435, 15.04152868, 20.89101218, 17.07523514,
       20.32448572, 13.91454887, 14.49939649, 14.60521201, 21.03911602,
       24.64066669, 20.36853501, 16.66182945, 19.71181244, 13.41344866])
```