Effective Programming Practices for Economists

Data Analysis in Python

Working with statsmodels’ results objects

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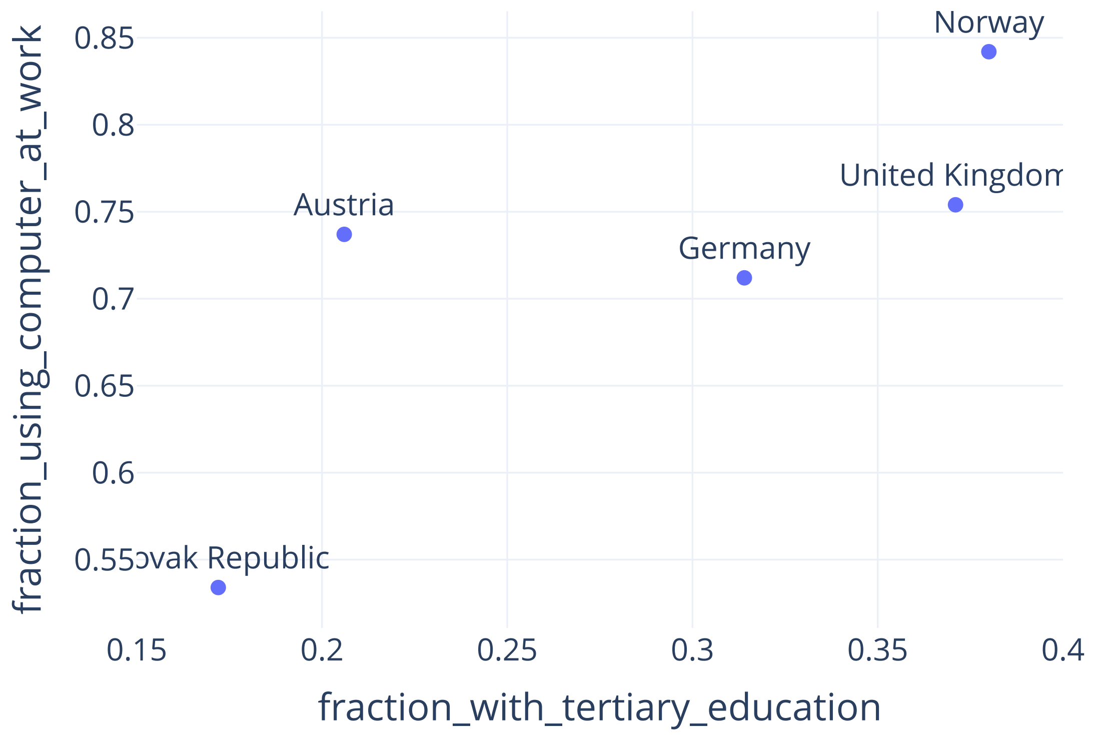
Example


Norway
United Kingdom
Austria
Germany
ovak Republic
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.15
0.2
0.25
0.3
0.35
0.4
fraction_using_computer_at_work
fraction_with_tertiary_education

Model and Results Objects

```
>>> model = smf.ols(
...     data=df,
...     formula="fraction_using_computer_at_work ~ fraction_with_tertiary_education",
... )
>>> model
<statsmodels.regression.linear_model.OLS at 0x7fb56c905250>

>>> all_results = model.fit(cov_type="nonrobust")
>>> all_results
<statsmodels.regression.linear_model.RegressionResultsWrapper at 0x7f84b22e7490>
```

`RegressionResultsWrapper` contains methods and attributes for all results

- Coefficient estimates
- Predictions / Residuals
- Variance-covariance matrix of estimates
- Many tests

Summarising Regression Results

```
>>> all_results.summary()
```

Dep. Variable:	fraction_using_computer_at_work	**R-squared:**	0.628
Model:	OLS	**Adj. R-squared:**	0.505
Method:	Least Squares	**F-statistic:**	5.074
No. Observations:	5	**Df Residuals:**	3

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	0.4445	0.126	3.541	0.038	0.045	0.844
fraction_with_tertiary_education	0.9399	0.417	2.253	0.110	-0.388	2.268

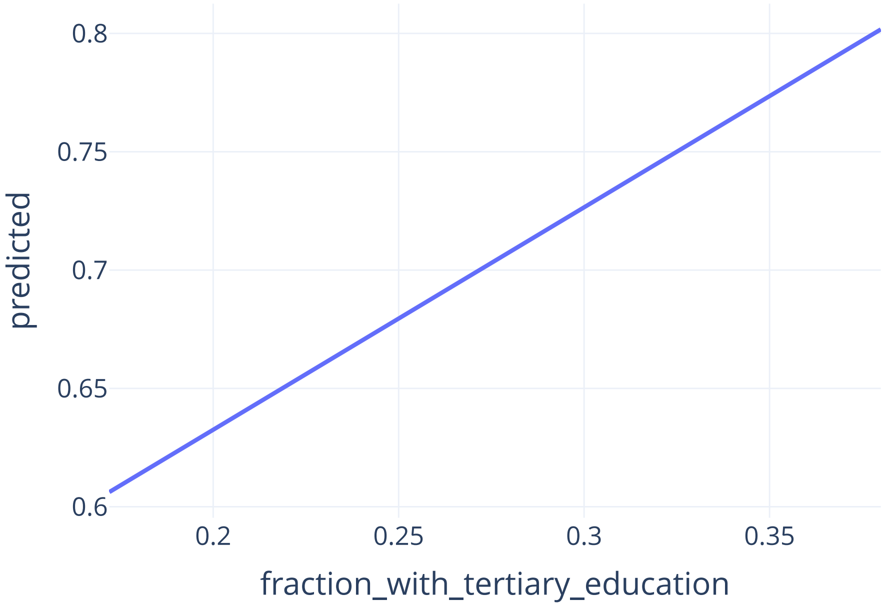
Add Mean Prediction to Data

```
>>> df["predicted"] = all_results.predict(df)
>>> df
```

country	fraction_with_tertiary_education	fraction_using_computer_at_work	predicted
Slovak Republic	0.172	0.534	0.606
Austria	0.206	0.737	0.638
Germany	0.314	0.712	0.74
United Kingdom	0.371	0.754	0.793
Norway	0.38	0.842	0.802

Plot the Regression Line

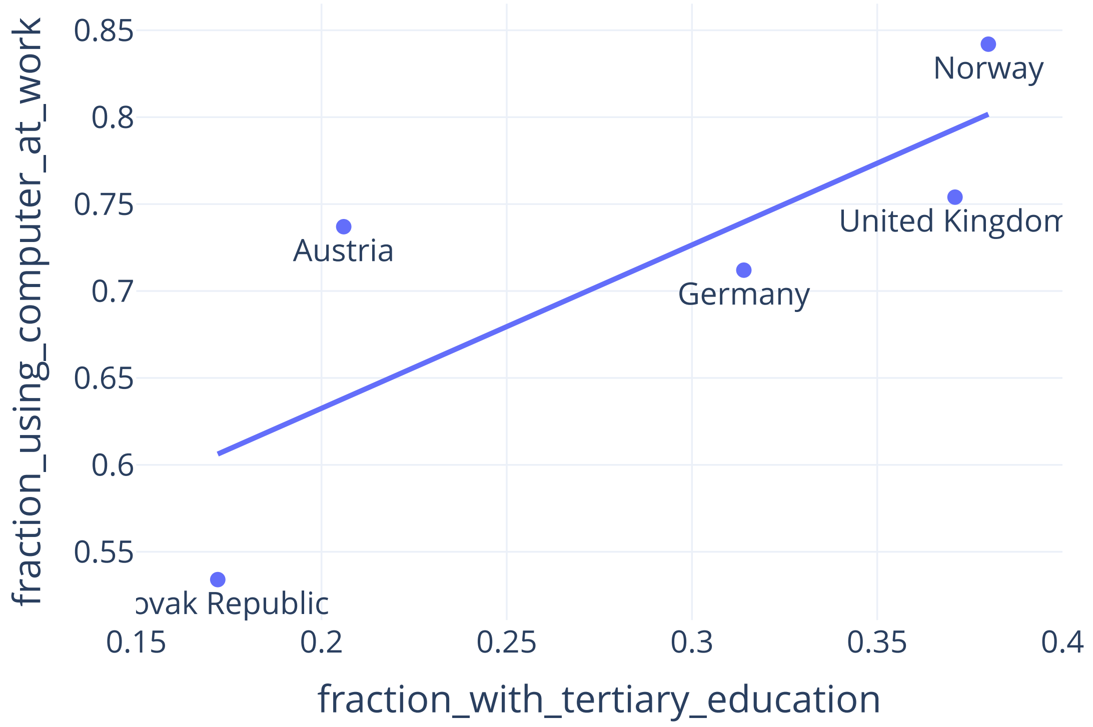
```
>>> line_fig = df.plot(x="fraction_with_tertiary_education", y="predicted")
>>> line_fig.show()
```



Add Regression Line to Scatter Plot

```
>>> fig = df.reset_index().plot.scatter(
...     x="fraction_with_tertiary_education",
...     y="fraction_using_computer_at_work",
...     text="country",
... )
>>> # Add the regression line
>>> fig.add_traces(line_fig.data)
>>> # Nicer formatting
>>> fig.update_traces(textposition="bottom center")
>>> fig.update_xaxes(range=(0.15, 0.4))
>>> fig.show()
```

Data Points and Regression Line


Norway
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