Ian_Dutta_PS2_problem_2_work

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```python
[2]: import pandas as pd
     import statsmodels.formula.api as smf

     # Load the data from the file 'PS2.csv'
     data = pd.read_csv('PS2.csv')

     # Run the regression with clustered standard errors by village code
     model = smf.ols('el_income_pc ~ treat', data=data).fit(cov_type='cluster',␣
      ↪cov_kwds={'groups': data['village_code']})

     # Coefficient for the treatment effect
     treat_coefficient = model.params['treat']
     # Standard error for the treatment effect
     treat_std_err = model.bse['treat']
     # P-value for the treatment effect
     treat_p_value = model.pvalues['treat']

     # Output the results
     print(f"Estimated treatment effect: {treat_coefficient:.2f}")
     print(f"Standard error: {treat_std_err:.2f}")
     print(f"P-value: {treat_p_value:.3f}")
```

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Estimated treatment effect: 44.05
Standard error: 30.07
P-value: 0.143
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```python
[3]: # Define the additional covariates to include in the model
     covariates = 'bl_hhsize + bl_widow + bl_has_children + bl_has_elder +␣
      ↪bl_own_livestock + bl_own_land + bl_own_tv_radio + bl_meals_eaten +␣
      ↪bl_emp_self + bl_emp_wage'

     # Run the regression with additional covariates and clustered standard errors␣
      ↪by village code
     model_with_covariates = smf.ols(f'el_income_pc ~ treat + {covariates}',␣
      ↪data=data).fit(cov_type='cluster', cov_kwds={'groups': data['village_code']})

     # Output the coefficient, standard error, and p-value for the treatment effect
```

```python
treat_coefficient_with_covariates = model_with_covariates.params['treat']
treat_std_err_with_covariates = model_with_covariates.bse['treat']
treat_p_value_with_covariates = model_with_covariates.pvalues['treat']

# Output the results
print(f"Estimated treatment effect with covariates:␣
 ↪{treat_coefficient_with_covariates:.2f}")
print(f"Standard error with covariates: {treat_std_err_with_covariates:.2f}")
print(f"P-value with covariates: {treat_p_value_with_covariates:.3f}")
```

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Estimated treatment effect with covariates: 49.11
Standard error with covariates: 31.01
P-value with covariates: 0.113
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