In [124]:
```
import statsmodels.api as sm
import numpy as np
from tabulate import tabulate
import pandas as pd
import statsmodels.formula.api as smf
from statsmodels.formula.api import ols
from linearmodels.panel import PanelOLS
from statsmodels.stats.stattools import durbin_watson
```

In [5]:
```
file_path = r'C:\Users\BRIDGET\Documents\My Spring 2024\My Spring Folder 2024\Econometri
df2 = pd.read_csv(file_path)
```

In [8]:
```
df2.head(10)
```

Out[8]:

	Year	State	Abb	atkin05	gini	rmeandev	theil	top10	top1	Hurricane Description	...	M
0	1946	Alabama	AL	0.183414	0.450865	0.609678	0.445901	0.339533	0.117825	NONE	...	
1	1946	Connecticut	CT	0.184396	0.447319	0.601974	0.461086	0.337660	0.124504	NONE	...	
2	1946	Florida	FL	0.213012	0.484664	0.670380	0.556997	0.379006	0.133172	5,6	...	
3	1946	Georgia	GA	0.185232	0.443881	0.612569	0.460402	0.346242	0.123761	NONE	...	
4	1946	Louisiana	LA	0.171094	0.427402	0.579887	0.411916	0.319825	0.109108	NONE	...	
5	1946	Maine	ME	0.171934	0.440724	0.601420	0.398397	0.316969	0.101663	NONE	...	
6	1946	Massachusetts	MA	0.172572	0.431320	0.583594	0.422054	0.327615	0.118184	NONE	...	
7	1946	Mississippi	MS	0.199282	0.481591	0.663530	0.476658	0.360990	0.117701	NONE	...	
8	1946	New York	NY	0.207056	0.473615	0.649174	0.543472	0.375975	0.141305	NONE	...	
9	1946	North Carolina	NC	0.192032	0.454558	0.620692	0.494478	0.349086	0.128649	NONE	...	

10 rows × 28 columns

In [9]:
```
print(df2.columns)
```

```
Index(['Year', 'State', 'Abb', 'atkin05', 'gini', 'rmeandev', 'theil', 'top10',
       'top1', 'Hurricane Description', ' Base Economic Damage ',
       'Normalized PL05', 'Normalized CL05', 'Category', 'CT', 'FL', 'GA',
       'LA', 'ME', 'MA', 'MS', 'NY', 'NC', 'RI', 'SC', 'TX', 'VA', 'Time'],
      dtype='object')
```

In [10]:
```
Normalized_PL05 = df2[['Normalized PL05']]
df2.head(5)
```

Out[10]:

	Year	State	Abb	atkin05	gini	rmeandev	theil	top10	top1	Hurricane Description	...	ME
0	1946	Alabama	AL	0.183414	0.450865	0.609678	0.445901	0.339533	0.117825	NONE	...	0
1	1946	Connecticut	CT	0.184396	0.447319	0.601974	0.461086	0.337660	0.124504	NONE	...	0
2	1946	Florida	FL	0.213012	0.484664	0.670380	0.556997	0.379006	0.133172	5,6	...	0
3	1946	Georgia	GA	0.185232	0.443881	0.612569	0.460402	0.346242	0.123761	NONE	...	0
4	1946	Louisiana	LA	0.171094	0.427402	0.579887	0.411916	0.319825	0.109108	NONE	...	0

5 rows × 28 columns

In [15]:
```
df2 = df2.set_index(['State', 'Time'], drop=False)
df2 = df2.sort_index()
```

In [33]:
```
dependent_variable = df2['gini']
independent_variables = df2[['Time','Normalized PL05', 'CT', 'FL', 'GA',
                             'LA', 'ME', 'MA', 'MS', 'NY', 'NC', 'RI', 'SC', 'TX', 'VA']
```

In [117]:
```
model = 'gini ~ 1 + Time + Q("Normalized PL05") + CT + FL + GA + LA + ME + MA + MS + NY +

mod = PanelOLS.from_formula(model, data=df2)

# Fit the model
results = mod.fit()
print(results)
```

...

In [116]:

```
coefficients = results.params
std_errors = results.std_errors
t_stats = results.tstats
p_values = results.pvalues

# Create a DataFrame to hold the results
summary_df = pd.DataFrame({
    'Variable': coefficients.index,
    'Coefficient': np.round(coefficients.values, 6),
    'SE.': np.round(std_errors.values, 6),
    'P-value': np.round(p_values.values, 6)
})

# Now you'll need to define your desired custom order based on the actual model variables
custom_order = ['Intercept', "Q('Normalized PL05')", 'Time', 'CT', 'FL', 'GA', 'LA', 'ME

# Ensure the 'Variable' column is set as the DataFrame index for reordering
summary_df.set_index('Variable', inplace=True)
summary_df = summary_df.reindex(custom_order).reset_index()

# Display or export your rounded custom summary table
print(summary_df)
```

	Variable	Coefficient	SE.	P-value
0	Intercept	0.294953	0.003943	0.000000
1	Q('Normalized PL05')	0.000000	0.000000	0.000064
2	Time	0.003190	0.000045	0.000000
3	CT	0.015697	0.004078	0.000127
4	FL	0.034833	0.004142	0.000000
5	GA	0.010932	0.004078	0.007487
6	LA	0.015973	0.004093	0.000103
7	ME	-0.011144	0.004078	0.006411
8	MA	0.002102	0.004078	0.606295
9	MS	0.019538	0.004078	0.000002
10	NY	0.025878	0.004078	0.000000
11	NC	-0.002120	0.004099	0.605045
12	RI	-0.009835	0.004078	0.016084
13	SC	-0.008748	0.004078	0.032219
14	TX	0.035740	0.004081	0.000000
15	VA	-0.002697	0.004078	0.508478

In [113]:

```
model = 'gini ~ 1 + Time + Q("Normalized PL05") + CT + FL + GA + LA + ME + MA + MS + NY +
```

Table 2 Fixed-effects regression results for years 1970–2005

In [122]:

```
print("\nTable 2 Fixed-effects regression results for years 1946–2005")
print(tabulate(summary_df, headers='keys', tablefmt='pretty', showindex=False))

print(f"R-squared: {results.rsquared:.4f}")
# Adjusted R-squared calculation
r_squared = results.rsquared
n = results.nobs
p = len(results.params) - 1
adjusted_r_squared = 1 - (1 - r_squared) * (n - 1) / (n - p - 1)
print(f"Adjusted R-squared: {adjusted_r_squared:.4f}")

#print F-statistic and its p-value for linearmodels.PanelOLS results
if hasattr(results, 'f_statistic'):
    f_stat = results.f_statistic
    print(f"F-statistics: {f_stat.stat:.4f}   Prob (F-statistic): {f_stat.pval:.4f}")
else:
    print("F-statistic and its p-value are not available.")

dw_stat = durbin_watson(results.resids)
print(f'Durbin-Watson statistic: {np.round(dw_stat, 4)}')
print(f"Number of observations: {results.nobs:,}")
```

```
Table 2 Fixed-effects regression results for years 1946–2005
+----------------------+-------------+----------+----------+
|       Variable       | Coefficient |   SE.    | P-value  |
+----------------------+-------------+----------+----------+
|      Intercept       |  0.294953   | 0.003943 |   0.0    |
| Q('Normalized PL05') |     0.0     |   0.0    | 6.4e-05  |
|         Time         |   0.00319   | 4.5e-05  |   0.0    |
|          CT          |  0.015697   | 0.004078 | 0.000127 |
|          FL          |  0.034833   | 0.004142 |   0.0    |
|          GA          |  0.010932   | 0.004078 | 0.007487 |
|          LA          |  0.015973   | 0.004093 | 0.000103 |
|          ME          |  -0.011144  | 0.004078 | 0.006411 |
|          MA          |  0.002102   | 0.004078 | 0.606295 |
|          MS          |  0.019538   | 0.004078 |  2e-06   |
|          NY          |  0.025878   | 0.004078 |   0.0    |
|          NC          |  -0.00212   | 0.004099 | 0.605045 |
|          RI          |  -0.009835  | 0.004078 | 0.016084 |
|          SC          |  -0.008748  | 0.004078 | 0.032219 |
|          TX          |   0.03574   | 0.004081 |   0.0    |
|          VA          |  -0.002697  | 0.004078 | 0.508478 |
+----------------------+-------------+----------+----------+
R-squared: 0.8712
Adjusted R-squared: 0.8689
F-statistics: 371.5667   Prob (F-statistic): 0.0000
Durbin-Watson statistic: 0.4123
Number of observations: 840
```

In [ ]: