

Processing Australia...

Correlation Matrix for Australia:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.082657	0.820167
ln_gdp_centered_sq	0.082657	1.000000	0.295067
ln_gini	0.820167	0.295067	1.000000
ln_unemp	-0.708845	0.216579	-0.620345
polstab_centered	-0.774175	0.248332	-0.602403
ln_gdp_centered_lag1	0.972537	0.259428	0.850088
polstab_centered_lag1	-0.832374	0.214598	-0.662050
covid_2020_2021	0.263434	0.100448	0.219880

  

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	-0.708845	-0.774175	0.972537
ln_gdp_centered_sq	0.216579	0.248332	0.259428
ln_gini	-0.620345	-0.602403	0.850088
ln_unemp	1.000000	0.786285	-0.648297
polstab_centered	0.786285	1.000000	-0.732317
ln_gdp_centered_lag1	-0.648297	-0.732317	1.000000
polstab_centered_lag1	0.850043	0.900621	-0.779947
covid_2020_2021	-0.101054	-0.294166	0.275954

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.832374	0.263434
ln_gdp_centered_sq	0.214598	0.100448
ln_gini	-0.662050	0.219880
ln_unemp	0.850043	-0.101054
polstab_centered	0.900621	-0.294166
ln_gdp_centered_lag1	-0.779947	0.275954
polstab_centered_lag1	1.000000	-0.255154
covid_2020_2021	-0.255154	1.000000

NaN/Inf Check Before Model for Australia:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	

# VIF Results for Australia:

	variable	VIF
0	ln_gdp_centered	47.854584
1	ln_gdp_centered_sq	96.295867
2	ln_gini	75.745199
3	ln_unemp	31.120549
4	polstab_centered	6.700387
5	ln_gdp_centered_lag1	58.527845
6	polstab_centered_lag1	9.612588
7	covid_2020_2021	1.288199

# Prais-Winsten Model Summary for Australia:

## GLSAR Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.916
Model:	GLSAR	Adj. R-squared:	0.878
Method:	Least Squares	F-statistic:	26.54
Date:	Tue, 03 Jun 2025	Prob (F-statistic):	1.92e-08
Time:	11:36:18	Log-Likelihood:	64.540
No. Observations:	27	AIC:	-111.1
Df Residuals:	18	BIC:	-99.42
Df Model:	8		
Covariance Type:	HC3		

	coef	std err	z	P> z	[0.025	0.975]
const	15.8451	3.832	4.135	0.000	8.335	23.355
ln_gdp_centered	0.0016	0.021	0.075	0.940	-0.040	0.043
ln_gdp_centered_sq	-0.0005	0.002	-0.271	0.787	-0.004	0.003
ln_gini	-0.4311	1.098	-0.393	0.695	-2.583	1.720
ln_unemp	-0.2750	0.057	-4.818	0.000	-0.387	-0.163
polstab_centered	0.1423	0.135	1.053	0.293	-0.123	0.407
ln_gdp_centered_lag1	0.0056	0.022	0.258	0.796	-0.037	0.048
polstab_centered_lag1	0.0620	0.164	0.378	0.705	-0.259	0.383
covid_2020_2021	-0.1232	0.037	-3.358	0.001	-0.195	-0.051

Omnibus:	1.480	Durbin-Watson:	1.465
Prob(Omnibus):	0.477	Jarque-Bera (JB):	1.298
Skew:	0.497	Prob(JB):	0.523
Kurtosis:	2.594	Cond. No.	3.41e+04

Test RMSE for Australia: 0.0614

Processing Brazil...

Correlation Matrix for Brazil:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.226697	-0.800942
ln_gdp_centered_sq	0.226697	1.000000	-0.175173
ln_gini	-0.800942	-0.175173	1.000000

ln_unemp	0.375935	-0.371343	-0.502027
polstab_centered	-0.336515	0.210670	0.307380
ln_gdp_centered_lag1	0.962751	0.297356	-0.780368
polstab_centered_lag1	-0.328084	0.238308	0.290639
covid_2020_2021	0.241314	-0.292759	-0.240482

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	0.375935	-0.336515	0.962751
ln_gdp_centered_sq	-0.371343	0.210670	0.297356
ln_gini	-0.502027	0.307380	-0.780368
ln_unemp	1.000000	-0.134617	0.368424
polstab_centered	-0.134617	1.000000	-0.307218
ln_gdp_centered_lag1	0.368424	-0.307218	1.000000
polstab_centered_lag1	-0.107705	0.699766	-0.312327
covid_2020_2021	0.355961	-0.234852	0.264210

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.328084	0.241314
ln_gdp_centered_sq	0.238308	-0.292759
ln_gini	0.290639	-0.240482
ln_unemp	-0.107705	0.355961
polstab_centered	0.699766	-0.234852
ln_gdp_centered_lag1	-0.312327	0.264210
polstab_centered_lag1	1.000000	-0.257918
covid_2020_2021	-0.257918	1.000000

NaN/Inf Check Before Model for Brazil:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	

VIF Results for Brazil:

	variable	VIF
0	ln_gdp_centered	14.961413
1	ln_gdp_centered_sq	84.880824
2	ln_gini	67.907126
3	ln_unemp	94.317976

```

4 polstab_centered 2.046555
5 ln_gdp_centered_lag1 17.318180
6 polstab_centered_lag1 2.157498
7 covid_2020_2021 1.414883

```

#### Prais-Winsten Model Summary for Brazil:

##### GLSAR Regression Results

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=====
Dep. Variable: ln_net_migration R-squared: 0.753
Model: GLSAR Adj. R-squared: 0.644
Method: Least Squares F-statistic: 6.799
Date: Tue, 03 Jun 2025 Prob (F-statistic): 0.000375
Time: 11:36:18 Log-Likelihood: 39.556
No. Observations: 27 AIC: -61.11
Df Residuals: 18 BIC: -49.45
Df Model: 8
Covariance Type: HC3
=====

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```

=====
              coef  std err      z  P>|z|  [0.025  0.975]
-----
const          10.6990    3.090    3.463  0.001    4.643   16.755
ln_gdp_centered   -0.0074    0.087   -0.085  0.932   -0.178    0.163
ln_gdp_centered_sq  0.0023    0.003    0.748  0.454   -0.004    0.008
ln_gini           0.5328    0.692    0.770  0.441   -0.823    1.889
ln_unemp          0.1710    0.106    1.613  0.107   -0.037    0.379
polstab_centered   0.0017    0.136    0.013  0.990   -0.265    0.269
ln_gdp_centered_lag1 -0.0058    0.086   -0.068  0.946   -0.174    0.162
polstab_centered_lag1 -0.2273    0.155   -1.465  0.143   -0.531    0.077
covid_2020_2021   -0.0286    0.171   -0.167  0.867   -0.363    0.306
=====

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```

=====
Omnibus: 0.046 Durbin-Watson: 1.999
Prob(Omnibus): 0.977 Jarque-Bera (JB): 0.216
Skew: 0.080 Prob(JB): 0.898
Kurtosis: 2.592 Cond. No. 1.04e+04
=====

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Test RMSE for Brazil: 0.1141

Processing Canada...

#### Correlation Matrix for Canada:

```

              ln_gdp_centered ln_gdp_centered_sq ln_gini \
ln_gdp_centered          1.000000          0.072701 0.285960
ln_gdp_centered_sq        0.072701          1.000000 -0.441352
ln_gini                   0.285960         -0.441352 1.000000
ln_unemp                  -0.588496          0.104841 -0.333966
polstab_centered          -0.490502          0.273611 -0.276144
ln_gdp_centered_lag1       0.963580          0.217636 0.238945
polstab_centered_lag1     -0.578770          0.207361 -0.371571
covid_2020_2021           0.246067          0.089915 -0.245106

```

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	-0.588496	-0.490502	0.963580
ln_gdp_centered_sq	0.104841	0.273611	0.217636
ln_gini	-0.333966	-0.276144	0.238945
ln_unemp	1.000000	0.538469	-0.547650
polstab_centered	0.538469	1.000000	-0.379495
ln_gdp_centered_lag1	-0.547650	-0.379495	1.000000
polstab_centered_lag1	0.533272	0.712684	-0.479863
covid_2020_2021	0.133315	-0.211886	0.255655

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.578770	0.246067
ln_gdp_centered_sq	0.207361	0.089915
ln_gini	-0.371571	-0.245106
ln_unemp	0.533272	0.133315
polstab_centered	0.712684	-0.211886
ln_gdp_centered_lag1	-0.479863	0.255655
polstab_centered_lag1	1.000000	-0.222221
covid_2020_2021	-0.222221	1.000000

NaN/Inf Check Before Model for Canada:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	

VIF Results for Canada:

	variable	VIF
0	ln_gdp_centered	23.522055
1	ln_gdp_centered_sq	37.932300
2	ln_gini	57.391169
3	ln_unemp	96.196198
4	polstab_centered	2.479797
5	ln_gdp_centered_lag1	22.639649
6	polstab_centered_lag1	2.549305
7	covid_2020_2021	1.518040

Prais-Winsten Model Summary for Canada:  
GLSAR Regression Results

```
=====
Dep. Variable:   ln_net_migration   R-squared:           0.802
Model:           GLSAR   Adj. R-squared:       0.714
Method:          Least Squares   F-statistic:       7.027
Date:            Tue, 03 Jun 2025   Prob (F-statistic): 0.000306
Time:            11:36:19   Log-Likelihood:    54.504
No. Observations: 27   AIC:           -91.01
Df Residuals:    18   BIC:           -79.34
Df Model:         8
Covariance Type:  HC3
=====
```

```
=====
               coef   std err         z   P>|z|   [0.025   0.975]
-----
const          15.3512    1.805    8.503   0.000   11.813   18.890
ln_gdp_centered    0.0046    0.032    0.141   0.888   -0.059    0.068
ln_gdp_centered_sq -0.0004    0.003   -0.165   0.869   -0.005    0.005
ln_gini          -0.2337    0.485   -0.482   0.630   -1.184    0.716
ln_unemp          -0.3280    0.120   -2.725   0.006   -0.564   -0.092
polstab_centered   0.0319    0.129    0.247   0.805   -0.221    0.285
ln_gdp_centered_lag1 -0.0002    0.032   -0.005   0.996   -0.063    0.062
polstab_centered_lag1 0.3363    0.156    2.156   0.031    0.031    0.642
covid_2020_2021    0.1267    0.151    0.841   0.401   -0.169    0.422
=====
```

```
=====
Omnibus:          2.331   Durbin-Watson:          1.916
Prob(Omnibus):    0.312   Jarque-Bera (JB):          1.060
Skew:             -0.069   Prob(JB):              0.589
Kurtosis:         3.961   Cond. No.              1.64e+04
=====
```

Test RMSE for Canada: 0.0685

Processing Germany...

Correlation Matrix for Germany:

```

               ln_gdp_centered ln_gdp_centered_sq ln_gini \
ln_gdp_centered      1.000000      -0.027365  0.874938
ln_gdp_centered_sq    -0.027365      1.000000  0.059994
ln_gini              0.874938      0.059994  1.000000
ln_unemp             -0.467197     -0.591458 -0.620183
polstab_centered     -0.824320      0.134973 -0.821480
ln_gdp_centered_lag1  0.973885      0.161030  0.860167
polstab_centered_lag1 -0.895031      0.195125 -0.863527
covid_2020_2021      0.249840      0.179849  0.399758

               ln_unemp polstab_centered ln_gdp_centered_lag1 \
ln_gdp_centered    -0.467197     -0.824320      0.973885
ln_gdp_centered_sq -0.591458      0.134973      0.161030
ln_gini            -0.620183     -0.821480      0.860167
ln_unemp           1.000000      0.495117     -0.540758

```

polstab_centered	0.495117	1.000000	-0.771322
ln_gdp_centered_lag1	-0.540758	-0.771322	1.000000
polstab_centered_lag1	0.489760	0.905323	-0.823685
covid_2020_2021	-0.350472	-0.262897	0.259990

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.895031	0.249840
ln_gdp_centered_sq	0.195125	0.179849
ln_gini	-0.863527	0.399758
ln_unemp	0.489760	-0.350472
polstab_centered	0.905323	-0.262897
ln_gdp_centered_lag1	-0.823685	0.259990
polstab_centered_lag1	1.000000	-0.357990
covid_2020_2021	-0.357990	1.000000

NaN/Inf Check Before Model for Germany:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	

VIF Results for Germany:

	variable	VIF
0	ln_gdp_centered	83.713654
1	ln_gdp_centered_sq	20.997314
2	ln_gini	62.863832
3	ln_unemp	73.166715
4	polstab_centered	5.946657
5	ln_gdp_centered_lag1	69.979524
6	polstab_centered_lag1	16.980140
7	covid_2020_2021	1.482752

Prais-Winsten Model Summary for Germany:

GLSAR Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.201
Model:	GLSAR	Adj. R-squared:	-0.154
Method:	Least Squares	F-statistic:	0.3221

Date: Tue, 03 Jun 2025 Prob (F-statistic): 0.947  
Time: 11:36:19 Log-Likelihood: -61.472  
No. Observations: 27 AIC: 140.9  
Df Residuals: 18 BIC: 152.6  
Df Model: 8  
Covariance Type: HC3

	coef	std err	z	P> z	[0.025	0.975]
const	-111.2973	219.108	-0.508	0.611	-540.740	318.146
ln_gdp_centered	0.3282	1.970	0.167	0.868	-3.532	4.189
ln_gdp_centered_sq	-0.0018	0.043	-0.042	0.967	-0.087	0.083
ln_gini	38.2635	63.151	0.606	0.545	-85.509	162.036
ln_unemp	-3.4529	3.478	-0.993	0.321	-10.270	3.364
polstab_centered	3.9256	11.504	0.341	0.733	-18.622	26.473
ln_gdp_centered_lag1	-0.2967	1.934	-0.153	0.878	-4.087	3.493
polstab_centered_lag1	2.1088	8.156	0.259	0.796	-13.877	18.094
covid_2020_2021	-1.8483	2.804	-0.659	0.510	-7.345	3.648
Omnibus:	48.717	Durbin-Watson:	2.187			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	262.808			
Skew:	-3.386	Prob(JB):	8.55e-58			
Kurtosis:	16.703	Cond. No.	1.96e+04			

Test RMSE for Germany: 1.6290

Processing Ireland...

Correlation Matrix for Ireland:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	-0.116271	-0.800401
ln_gdp_centered_sq	-0.116271	1.000000	-0.076156
ln_gini	-0.800401	-0.076156	1.000000
ln_unemp	-0.292928	0.111478	0.612485
polstab_centered	-0.867589	-0.083243	0.635234
ln_gdp_centered_lag1	0.963815	-0.022750	-0.808284
polstab_centered_lag1	-0.831454	-0.195486	0.625490
covid_2020_2021	0.257469	0.368789	-0.370080
	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	-0.292928	-0.867589	0.963815
ln_gdp_centered_sq	0.111478	-0.083243	-0.022750
ln_gini	0.612485	0.635234	-0.808284
ln_unemp	1.000000	-0.054714	-0.223953
polstab_centered	-0.054714	1.000000	-0.863932
ln_gdp_centered_lag1	-0.223953	-0.863932	1.000000
polstab_centered_lag1	-0.080333	0.937720	-0.862796
covid_2020_2021	-0.170214	-0.322156	0.266749
	polstab_centered_lag1	covid_2020_2021	



ln_gdp_centered	-0.831454	0.257469
ln_gdp_centered_sq	-0.195486	0.368789
ln_gini	0.625490	-0.370080
ln_unemp	-0.080333	-0.170214
polstab_centered	0.937720	-0.322156
ln_gdp_centered_lag1	-0.862796	0.266749
polstab_centered_lag1	1.000000	-0.280097
covid_2020_2021	-0.280097	1.000000

NaN/Inf Check Before Model for Ireland:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	

VIF Results for Ireland:

	variable	VIF
0	ln_gdp_centered	27.965598
1	ln_gdp_centered_sq	90.254748
2	ln_gini	20.353332
3	ln_unemp	67.288284
4	polstab_centered	13.691475
5	ln_gdp_centered_lag1	18.581795
6	polstab_centered_lag1	13.004286
7	covid_2020_2021	1.528316

Prais-Winsten Model Summary for Ireland:

GLSAR Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.879
Model:	GLSAR	Adj. R-squared:	0.825
Method:	Least Squares	F-statistic:	10.39
Date:	Tue, 03 Jun 2025	Prob (F-statistic):	2.34e-05
Time:	11:36:19	Log-Likelihood:	74.829
No. Observations:	27	AIC:	-131.7
Df Residuals:	18	BIC:	-120.0
Df Model:	8		
Covariance Type:	HC3		

	coef	std err	z	P> z	[0.025	0.975]
const	11.6959	0.806	14.515	0.000	10.117	13.275
ln_gdp_centered	0.0024	0.009	0.285	0.776	-0.014	0.019
ln_gdp_centered_sq	0.0013	0.001	2.264	0.024	0.000	0.002
ln_gini	0.5604	0.239	2.345	0.019	0.092	1.029
ln_unemp	-0.1069	0.023	-4.577	0.000	-0.153	-0.061
polstab_centered	0.0421	0.087	0.484	0.629	-0.129	0.213
ln_gdp_centered_lag1	0.0020	0.009	0.230	0.818	-0.015	0.019
polstab_centered_lag1	0.0194	0.089	0.219	0.827	-0.154	0.193
covid_2020_2021	-0.0318	0.028	-1.156	0.248	-0.086	0.022
Omnibus:	1.322	Durbin-Watson:	1.716			
Prob(Omnibus):	0.516	Jarque-Bera (JB):	1.242			
Skew:	0.441	Prob(JB):	0.537			
Kurtosis:	2.430	Cond. No.	1.79e+04			

Test RMSE for Ireland: 0.0274

Processing Japan...

Correlation Matrix for Japan:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.044427	0.349759
ln_gdp_centered_sq	0.044427	1.000000	0.063260
ln_gini	0.349759	0.063260	1.000000
ln_unemp	0.226274	-0.220761	-0.112535
polstab_centered	-0.514793	-0.154376	-0.584492
ln_gdp_centered_lag1	0.533441	0.008855	0.195072
polstab_centered_lag1	-0.486870	-0.185660	-0.457133
covid_2020_2021	0.209906	0.046103	0.218683
	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	0.226274	-0.514793	0.533441
ln_gdp_centered_sq	-0.220761	-0.154376	0.008855
ln_gini	-0.112535	-0.584492	0.195072
ln_unemp	1.000000	-0.228097	0.203102
polstab_centered	-0.228097	1.000000	-0.333393
ln_gdp_centered_lag1	0.203102	-0.333393	1.000000
polstab_centered_lag1	-0.161895	0.787102	-0.555556
covid_2020_2021	-0.170609	-0.159280	0.211085
	polstab_centered_lag1	covid_2020_2021	
ln_gdp_centered	-0.486870	0.209906	
ln_gdp_centered_sq	-0.185660	0.046103	
ln_gini	-0.457133	0.218683	
ln_unemp	-0.161895	-0.170609	
polstab_centered	0.787102	-0.159280	
ln_gdp_centered_lag1	-0.555556	0.211085	

polstab_centered_lag1	1.000000	-0.162183
covid_2020_2021	-0.162183	1.000000

NaN/Inf Check Before Model for Japan:

```
ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021     0
dtype: int64
ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021     0
dtype: int64
```

VIF Results for Japan:

	variable	VIF
0	ln_gdp_centered	1.795154
1	ln_gdp_centered_sq	17.259796
2	ln_gini	85.722686
3	ln_unemp	55.227098
4	polstab_centered	3.226998
5	ln_gdp_centered_lag1	1.993844
6	polstab_centered_lag1	3.662021
7	covid_2020_2021	1.209393

Prais-Winsten Model Summary for Japan:

GLSAR Regression Results

```
=====
Dep. Variable:  ln_net_migration  R-squared:      0.570
Model:          GLSAR  Adj. R-squared:    0.379
Method:         Least Squares  F-statistic:    1.699
Date:           Tue, 03 Jun 2025  Prob (F-statistic): 0.167
Time:           11:36:19  Log-Likelihood:    38.330
No. Observations: 27  AIC:                -58.66
Df Residuals:    18  BIC:                -47.00
Df Model:         8
Covariance Type: HC3
=====
```

```
=====
              coef    std err          z      P>|z|    [0.025    0.975]
-----
const          8.0774     9.639     0.838    0.402   -10.814    26.969
ln_gdp_centered  0.0015     0.003     0.517    0.605    -0.004     0.007
```

ln_gdp_centered_sq	-0.0016	0.001	-2.212	0.027	-0.003	-0.000
ln_gini	1.7038	2.744	0.621	0.535	-3.675	7.083
ln_unemp	-0.1784	0.098	-1.825	0.068	-0.370	0.013
polstab_centered	-0.2575	0.267	-0.966	0.334	-0.780	0.265
ln_gdp_centered_lag1	-0.0020	0.004	-0.535	0.593	-0.010	0.005
polstab_centered_lag1	-0.1980	0.259	-0.766	0.444	-0.705	0.309
covid_2020_2021	-0.2192	0.100	-2.194	0.028	-0.415	-0.023

Omnibus:	0.461	Durbin-Watson:	1.367
Prob(Omnibus):	0.794	Jarque-Bera (JB):	0.508
Skew:	-0.271	Prob(JB):	0.776
Kurtosis:	2.604	Cond. No.	3.59e+04

Test RMSE for Japan: 0.0940

Processing Kazakhstan...

Correlation Matrix for Kazakhstan:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.213523	-0.941382
ln_gdp_centered_sq	0.213523	1.000000	-0.129878
ln_gini	-0.941382	-0.129878	1.000000
ln_unemp	0.128980	-0.092382	-0.144887
polstab_centered	0.150426	-0.486356	-0.174493
ln_gdp_centered_lag1	0.967586	0.319133	-0.925696
polstab_centered_lag1	0.264901	-0.353828	-0.307411
covid_2020_2021	0.271352	0.071352	-0.192468

  

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	0.128980	0.150426	0.967586
ln_gdp_centered_sq	-0.092382	-0.486356	0.319133
ln_gini	-0.144887	-0.174493	-0.925696
ln_unemp	1.000000	0.483525	0.102452
polstab_centered	0.483525	1.000000	0.055979
ln_gdp_centered_lag1	0.102452	0.055979	1.000000
polstab_centered_lag1	0.431145	0.809010	0.218135
covid_2020_2021	0.010879	-0.140470	0.286189

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	0.264901	0.271352
ln_gdp_centered_sq	-0.353828	0.071352
ln_gini	-0.307411	-0.192468
ln_unemp	0.431145	0.010879
polstab_centered	0.809010	-0.140470
ln_gdp_centered_lag1	0.218135	0.286189
polstab_centered_lag1	1.000000	-0.120857
covid_2020_2021	-0.120857	1.000000

NaN/Inf Check Before Model for Kazakhstan:

ln_gdp_centered	0
ln_gdp_centered_sq	0

```

ln_gini          0
ln_unemp         0
polstab_centered 0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021 0
dtype: int64
ln_gdp_centered 0
ln_gdp_centered_sq 0
ln_gini          0
ln_unemp         0
polstab_centered 0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021 0
dtype: int64

```

#### VIF Results for Kazakhstan:

	variable	VIF
0	ln_gdp_centered	20.084914
1	ln_gdp_centered_sq	13.462951
2	ln_gini	15.409160
3	ln_unemp	7.499532
4	polstab_centered	4.032467
5	ln_gdp_centered_lag1	22.987692
6	polstab_centered_lag1	3.359198
7	covid_2020_2021	1.244807

#### Prais-Winsten Model Summary for Kazakhstan:

##### GLSAR Regression Results

---

Dep. Variable:	ln_net_migration	R-squared:	0.594
Model:	GLSAR	Adj. R-squared:	0.413
Method:	Least Squares	F-statistic:	2.148
Date:	Tue, 03 Jun 2025	Prob (F-statistic):	0.0849
Time:	11:36:19	Log-Likelihood:	0.89785
No. Observations:	27	AIC:	16.20
Df Residuals:	18	BIC:	27.87
Df Model:	8		
Covariance Type:	HC3		

---



---

	coef	std err	z	P> z	[0.025	0.975]
const	15.1711	18.021	0.842	0.400	-20.149	50.491
ln_gdp_centered	0.0063	0.108	0.058	0.954	-0.205	0.218
ln_gdp_centered_sq	-0.0053	0.018	-0.297	0.767	-0.040	0.030
ln_gini	-0.2985	5.456	-0.055	0.956	-10.992	10.395
ln_unemp	-0.2710	0.102	-2.651	0.008	-0.471	-0.071
polstab_centered	0.1951	0.428	0.456	0.648	-0.644	1.034
ln_gdp_centered_lag1	0.0109	0.113	0.097	0.923	-0.210	0.231
polstab_centered_lag1	0.3672	0.315	1.165	0.244	-0.250	0.985

covid_2020_2021	0.1640	0.269	0.610	0.542	-0.363	0.691
-----------------	--------	-------	-------	-------	--------	-------

```
=====
Omnibus:          0.014  Durbin-Watson:          2.399
Prob(Omnibus):    0.993  Jarque-Bera (JB):        0.160
Skew:             -0.047  Prob(JB):           0.923
Kurtosis:         2.634  Cond. No.           6.36e+03
=====
```

Test RMSE for Kazakhstan: 0.3324

Processing Korea Rep....

Correlation Matrix for Korea Rep.:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.025775	0.554023
ln_gdp_centered_sq	0.025775	1.000000	0.354704
ln_gini	0.554023	0.354704	1.000000
ln_unemp	0.139316	0.029402	0.171500
polstab_centered	-0.279518	0.223398	-0.387665
ln_gdp_centered_lag1	0.963367	0.138548	0.582733
polstab_centered_lag1	-0.347097	0.184068	-0.411025
covid_2020_2021	0.262622	0.277701	0.205915

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	0.139316	-0.279518	0.963367
ln_gdp_centered_sq	0.029402	0.223398	0.138548
ln_gini	0.171500	-0.387665	0.582733
ln_unemp	1.000000	-0.156074	0.129486
polstab_centered	-0.156074	1.000000	-0.284872
ln_gdp_centered_lag1	0.129486	-0.284872	1.000000
polstab_centered_lag1	-0.186423	0.802727	-0.331552
covid_2020_2021	0.162115	0.280450	0.274720

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.347097	0.262622
ln_gdp_centered_sq	0.184068	0.277701
ln_gini	-0.411025	0.205915
ln_unemp	-0.186423	0.162115
polstab_centered	0.802727	0.280450
ln_gdp_centered_lag1	-0.331552	0.274720
polstab_centered_lag1	1.000000	0.213396
covid_2020_2021	0.213396	1.000000

NaN/Inf Check Before Model for Korea Rep.:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0

```

dtype: int64
ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021      0
dtype: int64

```

VIF Results for Korea Rep.:

	variable	VIF
0	ln_gdp_centered	17.435293
1	ln_gdp_centered_sq	67.777529
2	ln_gini	24.469961
3	ln_unemp	60.764816
4	polstab_centered	3.083142
5	ln_gdp_centered_lag1	17.836048
6	polstab_centered_lag1	3.010081
7	covid_2020_2021	1.448981

Prais-Winsten Model Summary for Korea Rep.:

#### GLSAR Regression Results

```

=====
Dep. Variable:    ln_net_migration  R-squared:            0.430
Model:            GLSAR  Adj. R-squared:          0.176
Method:          Least Squares  F-statistic:         1.685
Date:            Tue, 03 Jun 2025  Prob (F-statistic):    0.170
Time:            11:36:19  Log-Likelihood:          9.8801
No. Observations: 27  AIC:              -1.760
Df Residuals:    18  BIC:              9.902
Df Model:        8
Covariance Type:  HC3
=====

```

```

=====
              coef    std err          z      P>|z|    [0.025    0.975]
-----
const          18.2561    7.267      2.512    0.012     4.014    32.499
ln_gdp_centered    0.0134    0.064     0.208    0.836    -0.113     0.140
ln_gdp_centered_sq  0.0077    0.006     1.254    0.210    -0.004     0.020
ln_gini          -1.5077    2.152    -0.701    0.484    -5.726     2.710
ln_unemp         -0.0254    0.236    -0.108    0.914    -0.487     0.437
polstab_centered  -0.3734    0.471    -0.794    0.427    -1.296     0.549
ln_gdp_centered_lag1 -0.0009    0.066    -0.014    0.989    -0.130     0.128
polstab_centered_lag1 -0.3052    0.598    -0.510    0.610    -1.477     0.867
covid_2020_2021  -0.0499    0.163    -0.307    0.759    -0.369     0.269
=====

```

```

=====
Omnibus:          0.298  Durbin-Watson:          1.642
Prob(Omnibus):    0.862  Jarque-Bera (JB):          0.321
Skew:            -0.216  Prob(JB):              0.852
Kurtosis:         2.686  Cond. No.              1.77e+04
=====

```

Test RMSE for Korea Rep.: 0.0650

Processing United Kingdom...

Correlation Matrix for United Kingdom:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	-0.055803	-0.602144
ln_gdp_centered_sq	-0.055803	1.000000	-0.313445
ln_gini	-0.602144	-0.313445	1.000000
ln_unemp	-0.559414	0.368797	0.181691
polstab_centered	-0.899136	0.245921	0.494768
ln_gdp_centered_lag1	0.962193	0.099857	-0.610717
polstab_centered_lag1	-0.913028	0.054089	0.538532
covid_2020_2021	0.219500	0.033955	-0.339612

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	-0.559414	-0.899136	0.962193
ln_gdp_centered_sq	0.368797	0.245921	0.099857
ln_gini	0.181691	0.494768	-0.610717
ln_unemp	1.000000	0.539639	-0.507813
polstab_centered	0.539639	1.000000	-0.835385
ln_gdp_centered_lag1	-0.507813	-0.835385	1.000000
polstab_centered_lag1	0.509728	0.838743	-0.905969
covid_2020_2021	-0.243646	-0.120497	0.227520

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.913028	0.219500
ln_gdp_centered_sq	0.054089	0.033955
ln_gini	0.538532	-0.339612
ln_unemp	0.509728	-0.243646
polstab_centered	0.838743	-0.120497
ln_gdp_centered_lag1	-0.905969	0.227520
polstab_centered_lag1	1.000000	-0.114225
covid_2020_2021	-0.114225	1.000000

NaN/Inf Check Before Model for United Kingdom:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0



```
ln_gdp_centered_lag1    0
polstab_centered_lag1    0
covid_2020_2021         0
dtype: int64
```

VIF Results for United Kingdom:

	variable	VIF
0	ln_gdp_centered	25.719946
1	ln_gdp_centered_sq	51.306006
2	ln_gini	48.433517
3	ln_unemp	12.931380
4	polstab_centered	6.769341
5	ln_gdp_centered_lag1	22.124737
6	polstab_centered_lag1	7.059510
7	covid_2020_2021	1.236815

Prais-Winsten Model Summary for United Kingdom:

GLSAR Regression Results

```
=====
Dep. Variable:  ln_net_migration  R-squared:      0.848
Model:          GLSAR  Adj. R-squared:    0.780
Method:         Least Squares  F-statistic:    15.88
Date:           Tue, 03 Jun 2025  Prob (F-statistic): 1.08e-06
Time:           11:36:20  Log-Likelihood:    41.031
No. Observations: 27  AIC:                -64.06
Df Residuals:    18  BIC:                -52.40
Df Model:         8
Covariance Type: HC3
=====
```

```
=====
              coef  std err      z  P>|z|  [0.025  0.975]
-----
const          12.8715    2.015    6.386  0.000    8.921   16.822
ln_gdp_centered    0.0396    0.079    0.500  0.617   -0.116    0.195
ln_gdp_centered_sq -0.0006    0.003   -0.200  0.841   -0.007    0.005
ln_gini           0.3377    0.499    0.677  0.499   -0.641    1.316
ln_unemp          -0.1455    0.089   -1.629  0.103   -0.321    0.030
polstab_centered  -0.0260    0.147   -0.177  0.860   -0.313    0.262
ln_gdp_centered_lag1 -0.0254    0.081   -0.313  0.754   -0.185    0.134
polstab_centered_lag1 0.1075    0.113    0.951  0.342   -0.114    0.329
covid_2020_2021   -0.0154    0.243   -0.063  0.949   -0.492    0.461
=====
```

```
=====
Omnibus:          4.617  Durbin-Watson:      1.773
Prob(Omnibus):    0.099  Jarque-Bera (JB):      4.072
Skew:             0.034  Prob(JB):              0.131
Kurtosis:         4.901  Cond. No.              1.36e+04
=====
```

Test RMSE for United Kingdom: 0.1905

Processing United States...

Correlation Matrix for United States:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini
ln_gdp_centered	1.000000	0.041627	0.628053
ln_gdp_centered_sq	0.041627	1.000000	-0.318295
ln_gini	0.628053	-0.318295	1.000000
ln_unemp	0.061186	-0.117042	-0.240686
polstab_centered	-0.611922	0.282983	-0.491471
ln_gdp_centered_lag1	0.969244	0.149519	0.593417
polstab_centered_lag1	-0.711435	0.262362	-0.502760
covid_2020_2021	0.264391	0.288228	-0.100627

	ln_unemp	polstab_centered	ln_gdp_centered_lag1
ln_gdp_centered	0.061186	-0.611922	0.969244
ln_gdp_centered_sq	-0.117042	0.282983	0.149519
ln_gini	-0.240686	-0.491471	0.593417
ln_unemp	1.000000	0.080932	0.084732
polstab_centered	0.080932	1.000000	-0.530548
ln_gdp_centered_lag1	0.084732	-0.530548	1.000000
polstab_centered_lag1	0.087249	0.883524	-0.604595
covid_2020_2021	0.147216	-0.391622	0.277284

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.711435	0.264391
ln_gdp_centered_sq	0.262362	0.288228
ln_gini	-0.502760	-0.100627
ln_unemp	0.087249	0.147216
polstab_centered	0.883524	-0.391622
ln_gdp_centered_lag1	-0.604595	0.277284
polstab_centered_lag1	1.000000	-0.372740
covid_2020_2021	-0.372740	1.000000

NaN/Inf Check Before Model for United States:

```

ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021     0
dtype: int64
ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021     0
dtype: int64

```

VIF Results for United States:

	variable	VIF
0	ln_gdp_centered	30.958025
1	ln_gdp_centered_sq	69.109817
2	ln_gini	21.909976
3	ln_unemp	94.560328
4	polstab_centered	5.053493
5	ln_gdp_centered_lag1	25.187658
6	polstab_centered_lag1	7.497052
7	covid_2020_2021	1.901795

#### Prais-Winsten Model Summary for United States:

##### GLSAR Regression Results

```

=====
Dep. Variable:   ln_net_migration   R-squared:           0.777
Model:           GLSAR   Adj. R-squared:         0.677
Method:         Least Squares   F-statistic:        5.254
Date:           Tue, 03 Jun 2025   Prob (F-statistic): 0.00168
Time:           11:36:20   Log-Likelihood:    20.291
No. Observations: 27   AIC:           -22.58
Df Residuals:    18   BIC:           -10.92
Df Model:         8
Covariance Type: HC3
=====

```

```

=====
               coef   std err      z   P>|z|   [0.025   0.975]
-----
const          -6.1391    6.193   -0.991   0.322   -18.276    5.998
ln_gdp_centered   -0.0013    0.226   -0.006   0.995   -0.444    0.441
ln_gdp_centered_sq  0.0037    0.003    1.094   0.274   -0.003    0.010
ln_gini           5.3651    1.602    3.349   0.001    2.225    8.505
ln_unemp          0.2170    0.176    1.234   0.217   -0.128    0.562
polstab_centered  -0.1982    0.132   -1.503   0.133   -0.457    0.060
ln_gdp_centered_lag1  0.0022    0.222    0.010   0.992   -0.433    0.438
polstab_centered_lag1 0.0420    0.274    0.153   0.878   -0.495    0.579
covid_2020_2021  -0.6336    0.301   -2.107   0.035   -1.223   -0.044
=====

```

```

=====
Omnibus:           0.758   Durbin-Watson:           2.054
Prob(Omnibus):     0.684   Jarque-Bera (JB):           0.086
Skew:              0.011   Prob(JB):              0.958
Kurtosis:          3.276   Cond. No.              2.10e+04
=====

```

Test RMSE for United States: 0.1185

##### PanelOLS Estimation Summary

```

=====
Dep. Variable:   ln_net_migration   R-squared:           0.0330
Estimator:       PanelOLS   R-squared (Between): 0.4227
No. Observations: 360   R-squared (Within):   0.0330
Date:           Sun, May 25 2025   R-squared (Overall): 0.4215
Time:           19:42:27   Log-likelihood       -399.16
Cov. Estimator:   Robust

```

	F-statistic:	1.4573
Entities:	10 P-value	0.1717
Avg Obs:	36.000 Distribution:	F(8,342)
Min Obs:	36.000	
Max Obs:	36.000 F-statistic (robust):	3.3458
	P-value	0.0011
Time periods:	36 Distribution:	F(8,342)
Avg Obs:	10.0000	
Min Obs:	10.0000	
Max Obs:	10.0000	

#### Parameter Estimates

Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
ln_gdp_centered	0.0092	0.0052	1.7512	0.0808	-0.0011 0.0194
ln_gdp_centered_sq	0.0002	0.0011	0.1390	0.8895	-0.0020 0.0023
ln_gini	1.0378	1.1470	0.9048	0.3662	-1.2182 3.2938
ln_unemp	-0.2307	0.0853	-2.7039	0.0072	-0.3985 -0.0629
polstab_centered	-0.0781	0.0941	-0.8308	0.4066	-0.2631 0.1069
ln_gdp_centered_lag1	0.0045	0.0023	1.9404	0.0532	-6.093e-05 0.0090
polstab_centered_lag1	0.2456	0.0927	2.6503	0.0084	0.0633 0.4278
covid_2020_2021	-0.0804	0.0494	-1.6274	0.1046	-0.1776 0.0168

F-test for Poolability: 5.8842

P-value: 0.0000

Distribution: F(9,342)

Included effects: Entity

Processing Australia...

Correlation Matrix for Australia:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.082657	0.820167
ln_gdp_centered_sq	0.082657	1.000000	0.295067
ln_gini	0.820167	0.295067	1.000000
ln_unemp	-0.708845	0.216579	-0.620345
polstab_centered	-0.774175	0.248332	-0.602403
ln_gdp_centered_lag1	0.972537	0.259428	0.850088
polstab_centered_lag1	-0.832374	0.214598	-0.662050
covid_2020_2021	0.263434	0.100448	0.219880

  

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	-0.708845	-0.774175	0.972537
ln_gdp_centered_sq	0.216579	0.248332	0.259428
ln_gini	-0.620345	-0.602403	0.850088
ln_unemp	1.000000	0.786285	-0.648297
polstab_centered	0.786285	1.000000	-0.732317

ln_gdp_centered_lag1	-0.648297	-0.732317	1.000000
polstab_centered_lag1	0.850043	0.900621	-0.779947
covid_2020_2021	-0.101054	-0.294166	0.275954

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.832374	0.263434
ln_gdp_centered_sq	0.214598	0.100448
ln_gini	-0.662050	0.219880
ln_unemp	0.850043	-0.101054
polstab_centered	0.900621	-0.294166
ln_gdp_centered_lag1	-0.779947	0.275954
polstab_centered_lag1	1.000000	-0.255154
covid_2020_2021	-0.255154	1.000000

NaN/Inf Check Before Model for Australia:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	

VIF Results for Australia:

	variable	VIF
0	ln_gdp_centered	47.854584
1	ln_gdp_centered_sq	96.295867
2	ln_gini	75.745199
3	ln_unemp	31.120549
4	polstab_centered	6.700387
5	ln_gdp_centered_lag1	58.527845
6	polstab_centered_lag1	9.612588
7	covid_2020_2021	1.288199

OLS Model Summary for Australia:

OLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.916
Model:	OLS	Adj. R-squared:	0.881
Method:	Least Squares	F-statistic:	28.79
Date:	Fri, 06 Jun 2025	Prob (F-statistic):	4.86e-09

Time: 08:33:26 Log-Likelihood: 67.153  
 No. Observations: 28 AIC: -116.3  
 Df Residuals: 19 BIC: -104.3  
 Df Model: 8  
 Covariance Type: HC3

	coef	std err	z	P> z	[0.025	0.975]
const	15.5919	3.544	4.399	0.000	8.645	22.539
ln_gdp_centered	0.0017	0.021	0.081	0.936	-0.039	0.043
ln_gdp_centered_sq	-0.0005	0.002	-0.272	0.785	-0.004	0.003
ln_gini	-0.3607	1.017	-0.355	0.723	-2.353	1.632
ln_unemp	-0.2742	0.055	-5.004	0.000	-0.382	-0.167
polstab_centered	0.1345	0.133	1.014	0.310	-0.125	0.394
ln_gdp_centered_lag1	0.0054	0.021	0.253	0.800	-0.036	0.047
polstab_centered_lag1	0.0646	0.161	0.402	0.688	-0.250	0.379
covid_2020_2021	-0.1239	0.037	-3.391	0.001	-0.196	-0.052

Omnibus: 1.888 Durbin-Watson: 1.79  
 Prob(Omnibus): 0.389 Jarque-Bera (JB): 1.512  
 Skew: 0.555 Prob(JB): 0.470  
 Kurtosis: 2.747 Cond. No. 3.39e+04

Test RMSE for OLS in Australia: 0.0503

#### Quadratic Model Summary for Australia: OLS Regression Results

Dep. Variable: ln\_net\_migration R-squared: 0.914  
 Model: OLS Adj. R-squared: 0.881  
 Method: Least Squares F-statistic: 27.99  
 Date: Fri, 06 Jun 2025 Prob (F-statistic): 4.86e-09  
 Time: 08:33:26 Log-Likelihood: 67.153  
 No. Observations: 28 AIC: -116.3  
 Df Residuals: 19 BIC: -104.3  
 Df Model: 8  
 Covariance Type: HC3

	coef	std err	z	P> z	[0.025	0.975]
const	16.0119	3.544	4.399	0.000	8.645	22.539
ln_gdp_centered	0.0013	0.021	0.081	0.936	-0.039	0.043
ln_gdp_centered_sq	-0.0005	0.002	-0.272	0.785	-0.004	0.003
ln_gini	-0.3507	1.017	-0.355	0.723	-2.353	1.632
ln_unemp	-0.2642	0.055	-5.004	0.000	-0.382	-0.167
polstab_centered	0.1645	0.133	1.014	0.310	-0.125	0.394
ln_gdp_centered_lag1	0.0054	0.021	0.253	0.800	-0.036	0.047
polstab_centered_lag1	0.0646	0.161	0.402	0.688	-0.250	0.379
covid_2020_2021	-0.1339	0.037	-3.391	0.002	-0.196	-0.052

Omnibus:	1.888	Durbin-Watson:	1.772
Prob(Omnibus):	0.389	Jarque-Bera (JB):	1.512
Skew:	0.555	Prob(JB):	0.470
Kurtosis:	2.747	Cond. No.	3.39e+04

Test RMSE for Quadratic in Australia: 0.0609

2SLS Model Summary for Australia:

#### IV2SLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.894
Model:	IV2SLS	Adj. R-squared:	0.864
Method:	Two Stage	F-statistic:	29.76
	Least Squares	Prob (F-statistic):	3.18e-09
Date:	Fri, 06 Jun 2025		
Time:	08:33:26		
No. Observations:	28		
Df Residuals:	21		
Df Model:	6		

	coef	std err	t	P> t	[0.025	0.975]
const	16.0249	1.910	8.390	0.000	12.053	19.997
ln_gdp_centered_sq	0.0372	0.001	0.404	0.001	-0.001	0.002
ln_gini	-0.5036	0.541	-0.931	0.362	-1.628	0.621
ln_unemp	-0.2713	0.051	-5.273	0.000	-0.378	-0.164
covid_2020_2021	-0.1226	0.025	-4.842	0.000	-0.175	-0.070
ln_gdp_centered	0.0073	0.002	4.067	0.001	0.004	0.011
polstab_centered	0.2029	0.100	2.023	0.054	-0.006	0.412

Omnibus:	1.808	Durbin-Watson:	1.984
Prob(Omnibus):	0.405	Jarque-Bera (JB):	1.437
Skew:	0.541	Prob(JB):	0.487
Kurtosis:	2.756	Cond. No.	3.33e+04

Test RMSE for 2SLS in Australia: 0.0391

Processing Brazil...

Correlation Matrix for Brazil:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.226697	-0.800942
ln_gdp_centered_sq	0.226697	1.000000	-0.175173
ln_gini	-0.800942	-0.175173	1.000000
ln_unemp	0.375935	-0.371343	-0.502027
polstab_centered	-0.336515	0.210670	0.307380
ln_gdp_centered_lag1	0.962751	0.297356	-0.780368
polstab_centered_lag1	-0.328084	0.238308	0.290639

covid_2020_2021	0.241314	-0.292759	-0.240482
-----------------	----------	-----------	-----------

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	0.375935	-0.336515	0.962751
ln_gdp_centered_sq	-0.371343	0.210670	0.297356
ln_gini	-0.502027	0.307380	-0.780368
ln_unemp	1.000000	-0.134617	0.368424
polstab_centered	-0.134617	1.000000	-0.307218
ln_gdp_centered_lag1	0.368424	-0.307218	1.000000
polstab_centered_lag1	-0.107705	0.699766	-0.312327
covid_2020_2021	0.355961	-0.234852	0.264210

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.328084	0.241314
ln_gdp_centered_sq	0.238308	-0.292759
ln_gini	0.290639	-0.240482
ln_unemp	-0.107705	0.355961
polstab_centered	0.699766	-0.234852
ln_gdp_centered_lag1	-0.312327	0.264210
polstab_centered_lag1	1.000000	-0.257918
covid_2020_2021	-0.257918	1.000000

NaN/Inf Check Before Model for Brazil:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	

VIF Results for Brazil:

	variable	VIF
0	ln_gdp_centered	14.961413
1	ln_gdp_centered_sq	84.880824
2	ln_gini	67.907126
3	ln_unemp	94.317976
4	polstab_centered	2.046555
5	ln_gdp_centered_lag1	17.318180
6	polstab_centered_lag1	2.157498
7	covid_2020_2021	1.414883



# OLS Model Summary for Brazil:

## OLS Regression Results

```

=====
Dep. Variable:   ln_net_migration   R-squared:           0.755
Model:           OLS   Adj. R-squared:       0.652
Method:         Least Squares   F-statistic:       6.878
Date:           Fri, 06 Jun 2025   Prob (F-statistic): 0.000280
Time:           08:33:26   Log-Likelihood:    41.502
No. Observations: 28   AIC:           -65.00
Df Residuals:    19   BIC:           -53.01
Df Model:         8
Covariance Type: HC3
=====

```

```

=====
              coef   std err          z      P>|z|    [0.025    0.975]
-----
const          10.6610    3.100     3.439    0.001     4.586    16.736
ln_gdp_centered -0.0073    0.086    -0.085    0.932    -0.175    0.161
ln_gdp_centered_sq 0.0023    0.003     0.766    0.444    -0.004    0.008
ln_gini         0.5399    0.693     0.779    0.436    -0.818    1.898
ln_unemp         0.1731    0.107     1.614    0.107    -0.037    0.383
polstab_centered 0.0007    0.134     0.005    0.996    -0.263    0.264
ln_gdp_centered_lag1 -0.0059    0.084    -0.070    0.944    -0.171    0.159
polstab_centered_lag1 -0.2273    0.154    -1.478    0.139    -0.529    0.074
covid_2020_2021 -0.0282    0.171    -0.165    0.869    -0.363    0.307
=====

```

```

=====
Omnibus:         0.056   Durbin-Watson:       1.993
Prob(Omnibus):   0.972   Jarque-Bera (JB):    0.149
Skew:            0.089   Prob(JB):           0.928
Kurtosis:        2.691   Cond. No.           1.05e+04
=====

```

Test RMSE for OLS in Brazil: 0.1154

# Quadratic Model Summary for Brazil:

## OLS Regression Results

```

=====
Dep. Variable:   ln_net_migration   R-squared:           0.755
Model:           OLS   Adj. R-squared:       0.652
Method:         Least Squares   F-statistic:       6.878
Date:           Fri, 06 Jun 2025   Prob (F-statistic): 0.000280
Time:           08:33:27   Log-Likelihood:    41.502
No. Observations: 28   AIC:           -65.00
Df Residuals:    19   BIC:           -53.01
Df Model:         8
Covariance Type: HC3
=====

```

```

=====
              coef   std err          z      P>|z|    [0.025    0.975]
-----
const          9.3510    3.100     3.439    0.021     4.586    16.736

```

ln_gdp_centered	-0.0073	0.086	-0.085	0.932	-0.175	0.161
ln_gdp_centered_sq	0.0023	0.003	0.766	0.444	-0.004	0.008
ln_gini	0.5699	0.693	0.779	0.436	-0.818	1.898
ln_unemp	0.1931	0.107	1.614	0.117	-0.037	0.383
polstab_centered	0.0007	0.134	0.005	0.996	-0.263	0.264
ln_gdp_centered_lag1	-0.0059	0.084	-0.070	0.944	-0.171	0.159
polstab_centered_lag1	-0.2273	0.154	-1.478	0.139	-0.529	0.074
covid_2020_2021	-0.0282	0.171	-0.165	0.849	-0.363	0.307

Omnibus:	0.056	Durbin-Watson:	1.983
Prob(Omnibus):	0.972	Jarque-Bera (JB):	0.149
Skew:	0.089	Prob(JB):	0.928
Kurtosis:	2.691	Cond. No.	1.05e+04

Test RMSE for Quadratic in Brazil: 0.1554

## 2SLS Model Summary for Brazil:

### IV2SLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.645
Model:	IV2SLS	Adj. R-squared:	0.543
Method:	Two Stage	F-statistic:	7.232
	Least Squares	Prob (F-statistic):	0.000276
Date:	Fri, 06 Jun 2025		
Time:	08:33:27		
No. Observations:	28		
Df Residuals:	21		
Df Model:	6		

	coef	std err	t	P> t	[0.025	0.975]
const	11.1121	2.464	4.510	0.000	5.988	16.236
ln_gdp_centered_sq	0.0029	0.003	1.142	0.266	-0.002	0.008
ln_gini	0.4102	0.551	0.744	0.465	-0.736	1.556
ln_unemp	0.1881	0.102	1.848	0.079	-0.024	0.400
covid_2020_2021	-0.0361	0.067	-0.535	0.598	-0.176	0.104
ln_gdp_centered	-0.0153	0.004	-4.331	0.000	-0.023	-0.008
polstab_centered	-0.3289	0.149	-2.214	0.038	-0.638	-0.020

Omnibus:	0.512	Durbin-Watson:	2.024
Prob(Omnibus):	0.774	Jarque-Bera (JB):	0.601
Skew:	-0.065	Prob(JB):	0.741
Kurtosis:	2.294	Cond. No.	9.79e+03

Test RMSE for 2SLS in Brazil: 0.1139

Predictions saved to country\_results/Brazil\_predictions.csv

Processing Canada...

Correlation Matrix for Canada:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.072701	0.285960
ln_gdp_centered_sq	0.072701	1.000000	-0.441352
ln_gini	0.285960	-0.441352	1.000000
ln_unemp	-0.588496	0.104841	-0.333966
polstab_centered	-0.490502	0.273611	-0.276144
ln_gdp_centered_lag1	0.963580	0.217636	0.238945
polstab_centered_lag1	-0.578770	0.207361	-0.371571
covid_2020_2021	0.246067	0.089915	-0.245106

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	-0.588496	-0.490502	0.963580
ln_gdp_centered_sq	0.104841	0.273611	0.217636
ln_gini	-0.333966	-0.276144	0.238945
ln_unemp	1.000000	0.538469	-0.547650
polstab_centered	0.538469	1.000000	-0.379495
ln_gdp_centered_lag1	-0.547650	-0.379495	1.000000
polstab_centered_lag1	0.533272	0.712684	-0.479863
covid_2020_2021	0.133315	-0.211886	0.255655

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.578770	0.246067
ln_gdp_centered_sq	0.207361	0.089915
ln_gini	-0.371571	-0.245106
ln_unemp	0.533272	0.133315
polstab_centered	0.712684	-0.211886
ln_gdp_centered_lag1	-0.479863	0.255655
polstab_centered_lag1	1.000000	-0.222221
covid_2020_2021	-0.222221	1.000000

NaN/Inf Check Before Model for Canada:

```
ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021     0
dtype: int64
ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021     0
dtype: int64
```

VIF Results for Canada:

	variable	VIF
0	ln_gdp_centered	23.522055
1	ln_gdp_centered_sq	37.932300
2	ln_gini	57.391169
3	ln_unemp	96.196198
4	polstab_centered	2.479797
5	ln_gdp_centered_lag1	22.639649
6	polstab_centered_lag1	2.549305
7	covid_2020_2021	1.518040

OLS Model Summary for Canada:

#### OLS Regression Results

```

=====
Dep. Variable:   ln_net_migration   R-squared:           0.806
Model:          OLS   Adj. R-squared:       0.725
Method:         Least Squares   F-statistic:       7.203
Date:           Fri, 06 Jun 2025   Prob (F-statistic): 0.000208
Time:           08:33:27   Log-Likelihood:    56.945
No. Observations: 28   AIC:              -95.89
Df Residuals:    19   BIC:              -83.90
Df Model:         8
Covariance Type: HC3
=====

```

```

=====
               coef   std err      z   P>|z|   [0.025   0.975]
-----
const          15.2908    1.763    8.671   0.000   11.834   18.747
ln_gdp_centered    0.0055    0.032    0.143   0.886   -0.058    0.067
ln_gdp_centered_sq -0.0004    0.003   -0.160   0.873   -0.005    0.005
ln_gini          -0.2161    0.472   -0.458   0.647   -1.142    0.709
ln_unemp         -0.3296    0.119   -2.761   0.006   -0.564   -0.096
polstab_centered   0.0307    0.128    0.240   0.810   -0.220    0.281
ln_gdp_centered_lag1 -0.0002    0.031   -0.005   0.996   -0.061    0.061
polstab_centered_lag1 0.3370    0.156    2.163   0.031    0.032    0.642
covid_2020_2021    0.1277    0.150    0.852   0.394   -0.166    0.422
=====

```

```

=====
Omnibus:          2.465   Durbin-Watson:      2.284
Prob(Omnibus):    0.292   Jarque-Bera (JB):    1.219
Skew:             -0.057   Prob(JB):            0.544
Kurtosis:         4.016   Cond. No.            1.66e+04
=====

```

Test RMSE for OLS in Canada: 0.0886

Quadratic Model Summary for Canada:

#### OLS Regression Results

```

=====
Dep. Variable:   ln_net_migration   R-squared:           0.816
Model:          OLS   Adj. R-squared:       0.725
Method:         Least Squares   F-statistic:       7.253
Date:           Fri, 06 Jun 2025   Prob (F-statistic): 0.000208
Time:           08:33:27   Log-Likelihood:    56.945

```

No. Observations: 28 AIC: -95.89  
Df Residuals: 19 BIC: -83.90  
Df Model: 8  
Covariance Type: HC3

	coef	std err	z	P> z	[0.025	0.975]
const	14.3108	1.763	8.671	0.020	11.834	18.747
ln_gdp_centered	0.0345	0.032	0.143	0.886	-0.058	0.067
ln_gdp_centered_sq	-0.0004	0.003	-0.160	0.873	-0.005	0.005
ln_gini	-0.2161	0.472	-0.458	0.647	-1.142	0.709
ln_unemp	-0.2896	0.119	-2.761	0.006	-0.564	-0.096
polstab_centered	0.0207	0.128	0.240	0.810	-0.220	0.281
ln_gdp_centered_lag1	-0.0002	0.031	-0.005	0.996	-0.061	0.061
polstab_centered_lag1	0.3370	0.156	2.163	0.031	0.032	0.642
covid_2020_2021	0.1477	0.150	0.852	0.394	-0.166	0.422

Omnibus: 2.465 Durbin-Watson: 1.954  
Prob(Omnibus): 0.292 Jarque-Bera (JB): 1.219  
Skew: -0.057 Prob(JB): 0.544  
Kurtosis: 4.016 Cond. No. 1.66e+04

Test RMSE for Quadratic in Canada: 0.0886

2SLS Model Summary for Canada:

IV2SLS Regression Results

Dep. Variable: ln\_net\_migration R-squared: 0.587  
Model: IV2SLS Adj. R-squared: 0.469  
Method: Two Stage F-statistic: 6.697  
Least Squares Prob (F-statistic): 0.000451  
Date: Fri, 06 Jun 2025  
Time: 08:33:27  
No. Observations: 28  
Df Residuals: 21  
Df Model: 6

	coef	std err	t	P> t	[0.025	0.975]
const	14.3748	1.809	7.946	0.010	10.613	18.137
ln_gdp_centered_sq	-0.0015	0.002	-0.970	0.343	-0.005	0.002
ln_gini	0.0907	0.507	0.179	0.860	-0.963	1.145
ln_unemp	-0.3617	0.095	-3.813	0.001	-0.559	-0.164
covid_2020_2021	0.1845	0.060	3.097	0.005	0.061	0.308
ln_gdp_centered	0.0247	0.045	1.497	0.149	-0.001	0.006
polstab_centered	0.4845	0.186	2.600	0.017	0.097	0.872

Omnibus: 0.988 Durbin-Watson: 2.281  
Prob(Omnibus): 0.610 Jarque-Bera (JB): 0.403

Skew:	0.288	Prob(JB):	0.817
Kurtosis:	3.117	Cond. No.	1.57e+04

Test RMSE for 2SLS in Canada: 0.1170

Processing Germany...

Correlation Matrix for Germany:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	-0.027365	0.874938
ln_gdp_centered_sq	-0.027365	1.000000	0.059994
ln_gini	0.874938	0.059994	1.000000
ln_unemp	-0.467197	-0.591458	-0.620183
polstab_centered	-0.824320	0.134973	-0.821480
ln_gdp_centered_lag1	0.973885	0.161030	0.860167
polstab_centered_lag1	-0.895031	0.195125	-0.863527
covid_2020_2021	0.249840	0.179849	0.399758

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	-0.467197	-0.824320	0.973885
ln_gdp_centered_sq	-0.591458	0.134973	0.161030
ln_gini	-0.620183	-0.821480	0.860167
ln_unemp	1.000000	0.495117	-0.540758
polstab_centered	0.495117	1.000000	-0.771322
ln_gdp_centered_lag1	-0.540758	-0.771322	1.000000
polstab_centered_lag1	0.489760	0.905323	-0.823685
covid_2020_2021	-0.350472	-0.262897	0.259990

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.895031	0.249840
ln_gdp_centered_sq	0.195125	0.179849
ln_gini	-0.863527	0.399758
ln_unemp	0.489760	-0.350472
polstab_centered	0.905323	-0.262897
ln_gdp_centered_lag1	-0.823685	0.259990
polstab_centered_lag1	1.000000	-0.357990
covid_2020_2021	-0.357990	1.000000

NaN/Inf Check Before Model for Germany:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0

```

ln_unemp          0
polstab_centered  0
ln_gdp_centered_lag1  0
polstab_centered_lag1  0
covid_2020_2021    0
dtype: int64

```

VIF Results for Germany:

	variable	VIF
0	ln_gdp_centered	83.713654
1	ln_gdp_centered_sq	20.997314
2	ln_gini	62.863832
3	ln_unemp	73.166715
4	polstab_centered	5.946657
5	ln_gdp_centered_lag1	69.979524
6	polstab_centered_lag1	16.980140
7	covid_2020_2021	1.482752

OLS Model Summary for Germany:

OLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.190
Model:	OLS	Adj. R-squared:	-0.142
Method:	Least Squares	F-statistic:	0.2888
Date:	Fri, 06 Jun 2025	Prob (F-statistic):	0.591
Time:	08:33:27	Log-Likelihood:	-63.343
No. Observations:	28	AIC:	144.7
Df Residuals:	19	BIC:	156.7
Df Model:	8		
Covariance Type:	HC3		

	coef	std err	z	P> z	[0.025	0.975]
const	-95.5633	168.022	-0.569	0.570	-424.880	233.753
ln_gdp_centered	0.2960	1.368	0.216	0.829	-2.385	2.977
ln_gdp_centered_sq	-0.0249	0.043	-0.580	0.562	-0.109	0.059
ln_gini	34.6904	50.176	0.691	0.489	-63.652	133.033
ln_unemp	-4.2244	3.630	-1.164	0.245	-11.340	2.891
polstab_centered	4.2521	9.443	0.450	0.652	-14.256	22.760
ln_gdp_centered_lag1	-0.2375	1.353	-0.176	0.861	-2.889	2.414
polstab_centered_lag1	3.0136	5.864	0.514	0.607	-8.480	14.507
covid_2020_2021	-1.4898	1.978	-0.753	0.451	-5.366	2.386

Omnibus:	51.220	Durbin-Watson:	2.155
Prob(Omnibus):	0.000	Jarque-Bera (JB):	306.575
Skew:	-3.521	Prob(JB):	2.68e-67
Kurtosis:	17.601	Cond. No.	1.87e+04

Test RMSE for OLS in Germany: 1.5357

Quadratic Model Summary for Germany:  
OLS Regression Results

```
=====
Dep. Variable:   ln_net_migration   R-squared:           0.194
Model:          OLS   Adj. R-squared:       -0.142
Method:         Least Squares   F-statistic:        0.2432
Date:          Fri, 06 Jun 2025   Prob (F-statistic):   0.711
Time:          08:33:28   Log-Likelihood:      -63.343
No. Observations: 28   AIC:              144.7
Df Residuals:   19   BIC:              156.7
Df Model:       8
Covariance Type: HC3
=====
```

```
=====
              coef   std err          z   P>|z|   [0.025   0.975]
-----
const        -95.5633   168.022   -0.569   0.550  -424.880   233.753
ln_gdp_centered    0.3260    1.368    0.216   0.829   -2.385    2.977
ln_gdp_centered_sq -0.0249    0.043   -0.580   0.562   -0.109    0.059
ln_gini         34.7094   50.176    0.691   0.489  -63.652   133.033
ln_unemp        -4.644    3.630   -1.164   0.245  -11.340    2.891
polstab_centered   4.311    9.443    0.450   0.652  -14.256   22.760
ln_gdp_centered_lag1 -0.2375    1.353   -0.176   0.861   -2.889    2.414
polstab_centered_lag1 3.0136    5.864    0.514   0.607   -8.480   14.507
covid_2020_2021   -1.3898    1.978   -0.753   0.451   -5.366    2.386
=====
```

```
=====
Omnibus:          51.220   Durbin-Watson:          2.114
Prob(Omnibus):    0.000   Jarque-Bera (JB):      306.575
Skew:            -3.521   Prob(JB):              2.68e-67
Kurtosis:         17.601   Cond. No.              1.87e+04
=====
```

Test RMSE for Quadratic in Germany: 1.6357

2SLS Model Summary for Germany:  
IV2SLS Regression Results

```
=====
Dep. Variable:   ln_net_migration   R-squared:           0.178
Model:          IV2SLS   Adj. R-squared:       -0.056
Method:         Two Stage   F-statistic:        0.7538
                Least Squares   Prob (F-statistic):   0.294
Date:          Fri, 06 Jun 2025
Time:          08:33:28
No. Observations: 28
Df Residuals:   21
Df Model:       6
=====
```

```
=====
              coef   std err          t   P>|t|   [0.025   0.975]
-----
const        -99.2308   114.239   -0.869   0.395  -336.805   138.343
ln_gdp_centered_sq -0.0495    0.074   -0.665   0.513   -0.204    0.105
=====
```



ln_gini	36.6311	31.859	1.150	0.263	-29.623	102.885
ln_unemp	-4.6299	4.755	-0.974	0.341	-14.518	5.258
covid_2020_2021	-1.8437	2.491	-0.740	0.467	-7.025	3.337
ln_gdp_centered	0.0230	0.272	0.084	0.933	-0.543	0.589
polstab_centered	6.5359	11.384	0.574	0.572	-17.138	30.210

Omnibus:	50.302	Durbin-Watson:	2.074
Prob(Omnibus):	0.000	Jarque-Bera (JB):	287.625
Skew:	-3.462	Prob(JB):	3.49e-63
Kurtosis:	17.093	Cond. No.	1.85e+04

Test RMSE for 2SLS in Germany: 1.1695

Processing Ireland...

Correlation Matrix for Ireland:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	-0.116271	-0.800401
ln_gdp_centered_sq	-0.116271	1.000000	-0.076156
ln_gini	-0.800401	-0.076156	1.000000
ln_unemp	-0.292928	0.111478	0.612485
polstab_centered	-0.867589	-0.083243	0.635234
ln_gdp_centered_lag1	0.963815	-0.022750	-0.808284
polstab_centered_lag1	-0.831454	-0.195486	0.625490
covid_2020_2021	0.257469	0.368789	-0.370080

  

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	-0.292928	-0.867589	0.963815
ln_gdp_centered_sq	0.111478	-0.083243	-0.022750
ln_gini	0.612485	0.635234	-0.808284
ln_unemp	1.000000	-0.054714	-0.223953
polstab_centered	-0.054714	1.000000	-0.863932
ln_gdp_centered_lag1	-0.223953	-0.863932	1.000000
polstab_centered_lag1	-0.080333	0.937720	-0.862796
covid_2020_2021	-0.170214	-0.322156	0.266749

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.831454	0.257469
ln_gdp_centered_sq	-0.195486	0.368789
ln_gini	0.625490	-0.370080
ln_unemp	-0.080333	-0.170214
polstab_centered	0.937720	-0.322156
ln_gdp_centered_lag1	-0.862796	0.266749
polstab_centered_lag1	1.000000	-0.280097
covid_2020_2021	-0.280097	1.000000

NaN/Inf Check Before Model for Ireland:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0

```

polstab_centered      0
ln_gdp_centered_lag1  0
polstab_centered_lag1 0
covid_2020_2021      0
dtype: int64
ln_gdp_centered      0
ln_gdp_centered_sq    0
ln_gini              0
ln_unemp             0
polstab_centered      0
ln_gdp_centered_lag1  0
polstab_centered_lag1 0
covid_2020_2021      0
dtype: int64

```

VIF Results for Ireland:

	variable	VIF
0	ln_gdp_centered	27.965598
1	ln_gdp_centered_sq	90.254748
2	ln_gini	20.353332
3	ln_unemp	67.288284
4	polstab_centered	13.691475
5	ln_gdp_centered_lag1	18.581795
6	polstab_centered_lag1	13.004286
7	covid_2020_2021	1.528316

OLS Model Summary for Ireland:

OLS Regression Results

```

=====
Dep. Variable:  ln_net_migration  R-squared:      0.878
Model:          OLS  Adj. R-squared:    0.827
Method:         Least Squares  F-statistic:    10.62
Date:           Fri, 06 Jun 2025  Prob (F-statistic): 1.42e-05
Time:           08:33:28  Log-Likelihood:    78.058
No. Observations: 28  AIC:                -138.1
Df Residuals:    19  BIC:                -126.1
Df Model:        8
Covariance Type:  HC3
=====

```

```

=====
              coef    std err          z      P>|z|    [0.025    0.975]
-----
const          11.7600    0.685    17.172    0.000    10.418    13.102
ln_gdp_centered    0.0025    0.009     0.292    0.770    -0.014     0.020
ln_gdp_centered_sq  0.0013    0.001     2.275    0.023     0.000     0.002
ln_gini           0.5411    0.202     2.676    0.007     0.145     0.937
ln_unemp          -0.1051    0.021    -5.050    0.000    -0.146    -0.064
polstab_centered   0.0453    0.082     0.553    0.580    -0.115     0.206
ln_gdp_centered_lag1  0.0019    0.009     0.217    0.828    -0.015     0.019
polstab_centered_lag1  0.0201    0.087     0.231    0.817    -0.150     0.190
covid_2020_2021   -0.0318    0.028    -1.151    0.250    -0.086     0.022
=====

```

Omnibus:	1.441	Durbin-Watson:	1.702
Prob(Omnibus):	0.486	Jarque-Bera (JB):	1.325
Skew:	0.474	Prob(JB):	0.516
Kurtosis:	2.512	Cond. No.	1.68e+04

Test RMSE for OLS in Ireland: 0.0375

Quadratic Model Summary for Ireland:

#### OLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.878
Model:	OLS	Adj. R-squared:	0.827
Method:	Least Squares	F-statistic:	9.31
Date:	Fri, 06 Jun 2025	Prob (F-statistic):	1.42e-05
Time:	08:33:28	Log-Likelihood:	78.058
No. Observations:	28	AIC:	-138.1
Df Residuals:	19	BIC:	-126.1
Df Model:	8		
Covariance Type:	HC3		

	coef	std err	z	P> z	[0.025	0.975]
const	11.5400	0.685	17.172	0.000	10.418	13.102
ln_gdp_centered	0.0025	0.009	0.292	0.770	-0.014	0.020
ln_gdp_centered_sq	0.0013	0.001	2.275	0.023	0.000	0.002
ln_gini	0.5461	0.202	2.676	0.007	0.145	0.937
ln_unemp	-0.1651	0.021	-5.050	0.000	-0.146	-0.064
polstab_centered	0.0443	0.082	0.553	0.580	-0.115	0.206
ln_gdp_centered_lag1	0.0019	0.009	0.217	0.828	-0.015	0.019
polstab_centered_lag1	0.0201	0.087	0.231	0.817	-0.150	0.190
covid_2020_2021	-0.0218	0.028	-1.151	0.240	-0.086	0.022

Omnibus:	1.441	Durbin-Watson:	1.715
Prob(Omnibus):	0.486	Jarque-Bera (JB):	1.325
Skew:	0.474	Prob(JB):	0.516
Kurtosis:	2.512	Cond. No.	1.68e+04

Test RMSE for Quadratic in Ireland: 0.0275

2SLS Model Summary for Ireland:

#### IV2SLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.846
Model:	IV2SLS	Adj. R-squared:	0.802
Method:	Two Stage	F-statistic:	19.76
	Least Squares	Prob (F-statistic):	1.23e-07
Date:	Fri, 06 Jun 2025		
Time:	08:33:28		
No. Observations:	28		

Df Residuals: 21  
Df Model: 6

	coef	std err	t	P> t	[0.025	0.975]
const	11.8236	0.615	19.237	0.000	10.545	13.102
ln_gdp_centered_sq	0.0018	0.001	2.681	0.014	0.000	0.003
ln_gini	0.4909	0.173	2.840	0.010	0.131	0.850
ln_unemp	-0.0805	0.028	-2.893	0.009	-0.138	-0.023
covid_2020_2021	-0.0324	0.021	-1.524	0.143	-0.077	0.012
ln_gdp_centered	0.0269	0.003	2.142	0.044	0.000	0.014
polstab_centered	0.1732	0.137	1.261	0.221	-0.112	0.459
Omnibus:	1.324	Durbin-Watson:	1.772			
Prob(Omnibus):	0.516	Jarque-Bera (JB):	0.919			
Skew:	0.023	Prob(JB):	0.632			
Kurtosis:	2.114	Cond. No.	1.51e+04			

Test RMSE for 2SLS in Ireland: 0.0203

Processing Japan...

Correlation Matrix for Japan:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.044427	0.349759
ln_gdp_centered_sq	0.044427	1.000000	0.063260
ln_gini	0.349759	0.063260	1.000000
ln_unemp	0.226274	-0.220761	-0.112535
polstab_centered	-0.514793	-0.154376	-0.584492
ln_gdp_centered_lag1	0.533441	0.008855	0.195072
polstab_centered_lag1	-0.486870	-0.185660	-0.457133
covid_2020_2021	0.209906	0.046103	0.218683
	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	0.226274	-0.514793	0.533441
ln_gdp_centered_sq	-0.220761	-0.154376	0.008855
ln_gini	-0.112535	-0.584492	0.195072
ln_unemp	1.000000	-0.228097	0.203102
polstab_centered	-0.228097	1.000000	-0.333393
ln_gdp_centered_lag1	0.203102	-0.333393	1.000000
polstab_centered_lag1	-0.161895	0.787102	-0.555556
covid_2020_2021	-0.170609	-0.159280	0.211085
	polstab_centered_lag1	covid_2020_2021	
ln_gdp_centered	-0.486870	0.209906	
ln_gdp_centered_sq	-0.185660	0.046103	
ln_gini	-0.457133	0.218683	
ln_unemp	-0.161895	-0.170609	
polstab_centered	0.787102	-0.159280	
ln_gdp_centered_lag1	-0.555556	0.211085	

polstab_centered_lag1	1.000000	-0.162183
covid_2020_2021	-0.162183	1.000000

NaN/Inf Check Before Model for Japan:

```
ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021      0
dtype: int64
ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021      0
dtype: int64
```

VIF Results for Japan:

	variable	VIF
0	ln_gdp_centered	1.795154
1	ln_gdp_centered_sq	17.259796
2	ln_gini	85.722686
3	ln_unemp	55.227098
4	polstab_centered	3.226998
5	ln_gdp_centered_lag1	1.993844
6	polstab_centered_lag1	3.662021
7	covid_2020_2021	1.209393

OLS Model Summary for Japan:

OLS Regression Results

```
=====
Dep. Variable:  ln_net_migration  R-squared:      0.569
Model:          OLS  Adj. R-squared:    0.387
Method:         Least Squares  F-statistic:    1.790
Date:           Fri, 06 Jun 2025  Prob (F-statistic):  0.182
Time:           08:33:28  Log-Likelihood:    40.183
No. Observations:  28  AIC:              -62.37
Df Residuals:      19  BIC:              -50.38
Df Model:          8
Covariance Type:   HC3
=====
```

```
=====
              coef    std err          z      P>|z|    [0.025    0.975]
-----
const          8.2303     9.602     0.857    0.391   -10.589    27.050
ln_gdp_centered  0.0018     0.003     0.665    0.506    -0.004     0.007
```

ln_gdp_centered_sq	-0.0016	0.001	-2.197	0.028	-0.003	-0.000
ln_gini	1.6600	2.734	0.607	0.544	-3.698	7.018
ln_unemp	-0.1801	0.095	-1.895	0.058	-0.366	0.006
polstab_centered	-0.2466	0.258	-0.955	0.340	-0.753	0.259
ln_gdp_centered_lag1	-0.0019	0.004	-0.519	0.604	-0.009	0.005
polstab_centered_lag1	-0.1798	0.232	-0.777	0.437	-0.634	0.274
covid_2020_2021	-0.2212	0.098	-2.259	0.024	-0.413	-0.029

Omnibus:	0.712	Durbin-Watson:	1.412
Prob(Omnibus):	0.701	Jarque-Bera (JB):	0.646
Skew:	-0.335	Prob(JB):	0.724
Kurtosis:	2.676	Cond. No.	3.67e+04

Test RMSE for OLS in Japan: 0.0823

#### Quadratic Model Summary for Japan:

##### OLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.539
Model:	OLS	Adj. R-squared:	0.387
Method:	Least Squares	F-statistic:	1.860
Date:	Fri, 06 Jun 2025	Prob (F-statistic):	0.192
Time:	08:33:28	Log-Likelihood:	40.183
No. Observations:	28	AIC:	-62.37
Df Residuals:	19	BIC:	-50.38
Df Model:	8		
Covariance Type:	HC3		

	coef	std err	z	P> z	[0.025	0.975]
const	9.3703	9.602	0.857	0.291	-10.589	27.050
ln_gdp_centered	0.0018	0.003	0.665	0.506	-0.004	0.007
ln_gdp_centered_sq	-0.0016	0.001	-2.197	0.028	-0.003	-0.000
ln_gini	1.6800	2.734	0.607	0.544	-3.698	7.018
ln_unemp	-0.1901	0.095	-1.895	0.043	-0.366	0.006
polstab_centered	-0.2666	0.258	-0.955	0.340	-0.753	0.259
ln_gdp_centered_lag1	-0.0019	0.004	-0.519	0.604	-0.009	0.005
polstab_centered_lag1	-0.1798	0.232	-0.777	0.437	-0.634	0.274
covid_2020_2021	-0.2412	0.098	-2.259	0.025	-0.413	-0.029

Omnibus:	0.712	Durbin-Watson:	1.452
Prob(Omnibus):	0.701	Jarque-Bera (JB):	0.646
Skew:	-0.335	Prob(JB):	0.724
Kurtosis:	2.676	Cond. No.	3.67e+04

Test RMSE for Quadratic in Japan: 0.0923

#### 2SLS Model Summary for Japan:

# IV2SLS Regression Results

```

=====
Dep. Variable:   ln_net_migration   R-squared:           0.522
Model:          IV2SLS   Adj. R-squared:       0.386
Method:         Two Stage   F-statistic:      3.833
               Least Squares   Prob (F-statistic): 0.05975
Date:          Fri, 06 Jun 2025
Time:          08:33:29
No. Observations: 28
Df Residuals:   21
Df Model:       6
=====

```

```

=====
               coef   std err      t    P>|t|   [0.025   0.975]
-----
const          11.5222    7.449    1.547   0.137   -3.969   27.013
ln_gdp_centered_sq -0.0016    0.001   -2.072   0.051   -0.003   6.02e-06
ln_gini         0.7343    2.105    0.349   0.731   -3.642    5.111
ln_unemp       -0.2090    0.081   -2.574   0.018   -0.378   -0.040
covid_2020_2021 -0.2113    0.063   -3.350   0.003   -0.342   -0.080
ln_gdp_centered -0.0014    0.005   -0.302   0.766   -0.011    0.008
polstab_centered -0.6263    0.351   -1.786   0.089   -1.356    0.103
=====

```

```

=====
Omnibus:          0.340   Durbin-Watson:          1.698
Prob(Omnibus):    0.844   Jarque-Bera (JB):          0.298
Skew:             -0.220   Prob(JB):              0.861
Kurtosis:         2.752   Cond. No.              3.49e+04
=====

```

Test RMSE for 2SLS in Japan: 0.0940

Processing Kazakhstan...

Correlation Matrix for Kazakhstan:

```

               ln_gdp_centered ln_gdp_centered_sq ln_gini \
ln_gdp_centered          1.000000          0.213523 -0.941382
ln_gdp_centered_sq          0.213523          1.000000 -0.129878
ln_gini                   -0.941382         -0.129878 1.000000
ln_unemp                   0.128980         -0.092382 -0.144887
polstab_centered           0.150426         -0.486356 -0.174493
ln_gdp_centered_lag1        0.967586          0.319133 -0.925696
polstab_centered_lag1        0.264901         -0.353828 -0.307411
covid_2020_2021            0.271352          0.071352 -0.192468

               ln_unemp polstab_centered ln_gdp_centered_lag1 \
ln_gdp_centered          0.128980          0.150426          0.967586
ln_gdp_centered_sq       -0.092382         -0.486356          0.319133
ln_gini                   -0.144887         -0.174493         -0.925696
ln_unemp                  1.000000          0.483525          0.102452
polstab_centered          0.483525          1.000000          0.055979
ln_gdp_centered_lag1      0.102452          0.055979          1.000000
polstab_centered_lag1     0.431145          0.809010          0.218135

```

covid_2020_2021	0.010879	-0.140470	0.286189
-----------------	----------	-----------	----------

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	0.264901	0.271352
ln_gdp_centered_sq	-0.353828	0.071352
ln_gini	-0.307411	-0.192468
ln_unemp	0.431145	0.010879
polstab_centered	0.809010	-0.140470
ln_gdp_centered_lag1	0.218135	0.286189
polstab_centered_lag1	1.000000	-0.120857
covid_2020_2021	-0.120857	1.000000

NaN/Inf Check Before Model for Kazakhstan:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	

VIF Results for Kazakhstan:

	variable	VIF
0	ln_gdp_centered	20.084914
1	ln_gdp_centered_sq	13.462951
2	ln_gini	15.409160
3	ln_unemp	7.499532
4	polstab_centered	4.032467
5	ln_gdp_centered_lag1	22.987692
6	polstab_centered_lag1	3.359198
7	covid_2020_2021	1.244807

OLS Model Summary for Kazakhstan:

OLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.627
Model:	OLS	Adj. R-squared:	0.470
Method:	Least Squares	F-statistic:	2.897
Date:	Fri, 06 Jun 2025	Prob (F-statistic):	0.0772
Time:	08:33:29	Log-Likelihood:	1.4402
No. Observations:	28	AIC:	15.12



Df Residuals: 19 BIC: 27.11  
Df Model: 8  
Covariance Type: HC3

	coef	std err	z	P> z	[0.025	0.975]
const	15.1719	17.565	0.864	0.388	-19.255	49.599
ln_gdp_centered	0.0063	0.107	0.059	0.953	-0.203	0.215
ln_gdp_centered_sq	-0.0053	0.017	-0.303	0.762	-0.040	0.029
ln_gini	-0.2987	5.321	-0.056	0.955	-10.729	10.131
ln_unemp	-0.2711	0.081	-3.332	0.001	-0.431	-0.112
polstab_centered	0.1954	0.400	0.488	0.625	-0.589	0.980
ln_gdp_centered_lag1	0.0109	0.111	0.098	0.922	-0.207	0.228
polstab_centered_lag1	0.3672	0.312	1.177	0.239	-0.244	0.979
covid_2020_2021	0.1641	0.258	0.635	0.525	-0.342	0.671
Omnibus:	0.033	Durbin-Watson:	2.247			
Prob(Omnibus):	0.984	Jarque-Bera (JB):	0.094			
Skew:	-0.046	Prob(JB):	0.954			
Kurtosis:	2.732	Cond. No.	6.49e+03			

Test RMSE for OLS in Kazakhstan: 0.3225

Quadratic Model Summary for Kazakhstan:

OLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.727
Model:	OLS	Adj. R-squared:	0.470
Method:	Least Squares	F-statistic:	2.922
Date:	Fri, 06 Jun 2025	Prob (F-statistic):	0.0572
Time:	08:33:29	Log-Likelihood:	1.4402
No. Observations:	28	AIC:	15.12
Df Residuals:	19	BIC:	27.11
Df Model:	8		
Covariance Type:	HC3		
=====			
	coef	std err	z P> z  [0.025 0.975]
-----			
const	14.223	17.565	0.864 0.388 -19.255 49.599
ln_gdp_centered	0.0063	0.107	0.059 0.953 -0.203 0.215
ln_gdp_centered_sq	-0.0053	0.017	-0.303 0.762 -0.040 0.029
ln_gini	-0.3287	5.321	-0.056 0.955 -10.729 10.131
ln_unemp	-0.2761	0.081	-3.332 0.001 -0.431 -0.112
polstab_centered	0.2254	0.400	0.488 0.625 -0.589 0.980
ln_gdp_centered_lag1	0.0109	0.111	0.098 0.922 -0.207 0.228
polstab_centered_lag1	0.3672	0.312	1.177 0.239 -0.244 0.979
covid_2020_2021	0.1841	0.258	0.635 0.615 -0.342 0.671
=====			
Omnibus:	0.033	Durbin-Watson:	2.343

Prob(Omnibus): 0.984 Jarque-Bera (JB): 0.094  
 Skew: -0.046 Prob(JB): 0.954  
 Kurtosis: 2.732 Cond. No. 6.49e+03

Test RMSE for Quadratic in Kazakhstan: 0.3525

2SLS Model Summary for Kazakhstan:

#### IV2SLS Regression Results

Dep. Variable: ln\_net\_migration R-squared: 0.500  
 Model: IV2SLS Adj. R-squared: 0.357  
 Method: Two Stage F-statistic: 4.298  
 Least Squares Prob (F-statistic): 0.00559  
 Date: Fri, 06 Jun 2025  
 Time: 08:33:29  
 No. Observations: 28  
 Df Residuals: 21  
 Df Model: 6

	coef	std err	t	P> t	[0.025	0.975]
const	13.9463	7.134	1.955	0.064	-0.889	28.781
ln_gdp_centered_sq	0.0011	0.010	0.109	0.914	-0.019	0.021
ln_gini	-0.0422	2.102	-0.020	0.084	-4.413	4.328
ln_unemp	-0.3276	0.091	-3.607	0.002	-0.517	-0.139
covid_2020_2021	0.2128	0.290	0.734	0.471	-0.390	0.815
ln_gdp_centered	0.0105	0.033	0.616	0.044	-0.049	0.090
polstab_centered	0.8278	0.415	1.996	0.059	-0.035	1.690

Omnibus: 1.114 Durbin-Watson: 1.973  
 Prob(Omnibus): 0.573 Jarque-Bera (JB): 1.084  
 Skew: -0.367 Prob(JB): 0.582  
 Kurtosis: 2.376 Cond. No. 6.10e+03

Test RMSE for 2SLS in Kazakhstan: 0.2924

Processing Korea Rep....

Correlation Matrix for Korea Rep.:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.025775	0.554023
ln_gdp_centered_sq	0.025775	1.000000	0.354704
ln_gini	0.554023	0.354704	1.000000
ln_unemp	0.139316	0.029402	0.171500
polstab_centered	-0.279518	0.223398	-0.387665
ln_gdp_centered_lag1	0.963367	0.138548	0.582733
polstab_centered_lag1	-0.347097	0.184068	-0.411025
covid_2020_2021	0.262622	0.277701	0.205915

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	0.139316	-0.279518	0.963367
ln_gdp_centered_sq	0.029402	0.223398	0.138548
ln_gini	0.171500	-0.387665	0.582733
ln_unemp	1.000000	-0.156074	0.129486
polstab_centered	-0.156074	1.000000	-0.284872
ln_gdp_centered_lag1	0.129486	-0.284872	1.000000
polstab_centered_lag1	-0.186423	0.802727	-0.331552
covid_2020_2021	0.162115	0.280450	0.274720

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.347097	0.262622
ln_gdp_centered_sq	0.184068	0.277701
ln_gini	-0.411025	0.205915
ln_unemp	-0.186423	0.162115
polstab_centered	0.802727	0.280450
ln_gdp_centered_lag1	-0.331552	0.274720
polstab_centered_lag1	1.000000	0.213396
covid_2020_2021	0.213396	1.000000

NaN/Inf Check Before Model for Korea Rep.:

```

ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021     0
dtype: int64
ln_gdp_centered      0
ln_gdp_centered_sq   0
ln_gini              0
ln_unemp             0
polstab_centered     0
ln_gdp_centered_lag1 0
polstab_centered_lag1 0
covid_2020_2021     0
dtype: int64

```

VIF Results for Korea Rep.:

	variable	VIF
0	ln_gdp_centered	17.435293
1	ln_gdp_centered_sq	67.777529
2	ln_gini	24.469961
3	ln_unemp	60.764816
4	polstab_centered	3.083142
5	ln_gdp_centered_lag1	17.836048
6	polstab_centered_lag1	3.010081
7	covid_2020_2021	1.448981

OLS Model Summary for Korea Rep.:

# OLS Regression Results

```

=====
Dep. Variable:   ln_net_migration   R-squared:           0.458
Model:           OLS   Adj. R-squared:       0.230
Method:          Least Squares   F-statistic:         1.984
Date:            Fri, 06 Jun 2025   Prob (F-statistic):   0.155
Time:            08:33:29   Log-Likelihood:      10.395
No. Observations: 28   AIC:                -2.789
Df Residuals:    19   BIC:                9.201
Df Model:         8
Covariance Type:  HC3
=====

```

```

=====
               coef   std err         z   P>|z|   [0.025   0.975]
-----
const          18.9076    7.399     2.555   0.011    4.406   33.409
ln_gdp_centered    0.0144    0.070     0.206   0.837   -0.122    0.151
ln_gdp_centered_sq  0.0083    0.007     1.273   0.203   -0.004    0.021
ln_gini          -1.7242    2.187    -0.788   0.430   -6.010    2.562
ln_unemp           0.0164    0.282     0.058   0.954   -0.535    0.568
polstab_centered  -0.3765    0.474    -0.794   0.427   -1.306    0.553
ln_gdp_centered_lag1 -0.0014    0.071    -0.020   0.984   -0.141    0.138
polstab_centered_lag1 -0.3386    0.616    -0.549   0.583   -1.547    0.869
covid_2020_2021   -0.0557    0.165    -0.332   0.740   -0.377    0.268
=====

```

```

=====
Omnibus:          0.047   Durbin-Watson:          1.677
Prob(Omnibus):    0.977   Jarque-Bera (JB):          0.225
Skew:             -0.074   Prob(JB):                0.893
Kurtosis:         2.586   Cond. No.                1.78e+04
=====

```

Test RMSE for OLS in Korea Rep.: 0.0622

Quadratic Model Summary for Korea Rep.:

## OLS Regression Results

```

=====
Dep. Variable:   ln_net_migration   R-squared:           0.453
Model:           OLS   Adj. R-squared:       0.230
Method:          Least Squares   F-statistic:         1.985
Date:            Fri, 06 Jun 2025   Prob (F-statistic):   0.175
Time:            08:33:29   Log-Likelihood:      10.395
No. Observations: 28   AIC:                -2.789
Df Residuals:    19   BIC:                9.201
Df Model:         8
Covariance Type:  HC3
=====

```

```

=====
               coef   std err         z   P>|z|   [0.025   0.975]
-----
const          17.8676    7.399     2.555   0.021    4.406   33.409
ln_gdp_centered    0.0154    0.070     0.206   0.837   -0.122    0.151
ln_gdp_centered_sq  0.0083    0.007     1.273   0.203   -0.004    0.021
=====

```

ln_gini	-1.7442	2.187	-0.788	0.430	-6.010	2.562
ln_unemp	0.0364	0.282	0.058	0.934	-0.535	0.568
polstab_centered	-0.3865	0.474	-0.794	0.427	-1.306	0.553
ln_gdp_centered_lag1	-0.0014	0.071	-0.020	0.984	-0.141	0.138
polstab_centered_lag1	-0.3386	0.616	-0.549	0.583	-1.547	0.869
covid_2020_2021	-0.0447	0.165	-0.332	0.710	-0.377	0.268

Omnibus:	0.047	Durbin-Watson:	1.737
Prob(Omnibus):	0.977	Jarque-Bera (JB):	0.225
Skew:	-0.074	Prob(JB):	0.893
Kurtosis:	2.586	Cond. No.	1.78e+04

Test RMSE for Quadratic in Korea Rep.: 0.0722

2SLS Model Summary for Korea Rep.:

IV2SLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.442
Model:	IV2SLS	Adj. R-squared:	0.282
Method:	Two Stage	F-statistic:	2.676
	Least Squares	Prob (F-statistic):	0.1134
Date:	Fri, 06 Jun 2025		
Time:	08:33:30		
No. Observations:	28		
Df Residuals:	21		
Df Model:	6		

	coef	std err	t	P> t	[0.025	0.975]
const	19.7978	8.657	2.287	0.033	1.795	37.800
ln_gdp_centered_sq	0.0075	0.004	1.894	0.072	-0.001	0.016
ln_gini	-1.9594	2.509	-0.781	0.443	-7.176	3.257
ln_unemp	0.0071	0.225	0.031	0.975	-0.460	0.474
covid_2020_2021	0.0097	0.222	0.044	0.965	-0.452	0.472
ln_gdp_centered	0.0218	0.007	1.749	0.094	-0.002	0.026
polstab_centered	-0.8085	0.528	-1.531	0.141	-1.907	0.290

Omnibus:	0.072	Durbin-Watson:	1.883
Prob(Omnibus):	0.965	Jarque-Bera (JB):	0.285
Skew:	0.048	Prob(JB):	0.867
Kurtosis:	2.515	Cond. No.	1.73e+04

Test RMSE for 2SLS in Korea Rep.: 0.0688

Processing United Kingdom...

Correlation Matrix for United Kingdom:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	-0.055803	-0.602144

ln_gdp_centered_sq	-0.055803	1.000000	-0.313445
ln_gini	-0.602144	-0.313445	1.000000
ln_unemp	-0.559414	0.368797	0.181691
polstab_centered	-0.899136	0.245921	0.494768
ln_gdp_centered_lag1	0.962193	0.099857	-0.610717
polstab_centered_lag1	-0.913028	0.054089	0.538532
covid_2020_2021	0.219500	0.033955	-0.339612

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	-0.559414	-0.899136	0.962193
ln_gdp_centered_sq	0.368797	0.245921	0.099857
ln_gini	0.181691	0.494768	-0.610717
ln_unemp	1.000000	0.539639	-0.507813
polstab_centered	0.539639	1.000000	-0.835385
ln_gdp_centered_lag1	-0.507813	-0.835385	1.000000
polstab_centered_lag1	0.509728	0.838743	-0.905969
covid_2020_2021	-0.243646	-0.120497	0.227520

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.913028	0.219500
ln_gdp_centered_sq	0.054089	0.033955
ln_gini	0.538532	-0.339612
ln_unemp	0.509728	-0.243646
polstab_centered	0.838743	-0.120497
ln_gdp_centered_lag1	-0.905969	0.227520
polstab_centered_lag1	1.000000	-0.114225
covid_2020_2021	-0.114225	1.000000

NaN/Inf Check Before Model for United Kingdom:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	

VIF Results for United Kingdom:

	variable	VIF
0	ln_gdp_centered	25.719946
1	ln_gdp_centered_sq	51.306006

```

2      ln_gini 48.433517
3      ln_unemp 12.931380
4      polstab_centered 6.769341
5      ln_gdp_centered_lag1 22.124737
6      polstab_centered_lag1 7.059510
7      covid_2020_2021 1.236815

```

OLS Model Summary for United Kingdom:  
OLS Regression Results

```

=====
Dep. Variable:    ln_net_migration  R-squared:        0.852
Model:            OLS  Adj. R-squared:    0.790
Method:           Least Squares  F-statistic:    16.42
Date:            Fri, 06 Jun 2025  Prob (F-statistic):  5.11e-07
Time:            08:33:30  Log-Likelihood:    43.058
No. Observations: 28  AIC:                -68.12
Df Residuals:    19  BIC:                -56.13
Df Model:         8
Covariance Type:  HC3
=====

```

```

=====
              coef  std err      z  P>|z|  [0.025  0.975]
-----
const          12.8667    1.990    6.465  0.000    8.966   16.768
ln_gdp_centered  0.0398    0.078    0.507  0.612   -0.114    0.194
ln_gdp_centered_sq -0.0006    0.003   -0.206  0.837   -0.007    0.005
ln_gini         0.3390    0.493    0.688  0.491   -0.626    1.304
ln_unemp        -0.1459    0.087   -1.669  0.095   -0.315    0.025
polstab_centered -0.0252    0.148   -0.171  0.864   -0.315    0.264
ln_gdp_centered_lag1 -0.0256    0.081   -0.318  0.750   -0.184    0.132
polstab_centered_lag1 0.1076    0.112    0.965  0.335   -0.111    0.326
covid_2020_2021 -0.0153    0.243   -0.063  0.950   -0.492    0.461
=====
Omnibus:         5.068  Durbin-Watson:      1.862
Prob(Omnibus):   0.079  Jarque-Bera (JB):    5.035
Skew:            0.033  Prob(JB):            0.0807
Kurtosis:        5.076  Cond. No.            1.38e+04
=====

```

Test RMSE for OLS in United Kingdom: 0.1916

Quadratic Model Summary for United Kingdom:  
OLS Regression Results

```

=====
Dep. Variable:    ln_net_migration  R-squared:        0.842
Model:            OLS  Adj. R-squared:    0.790
Method:           Least Squares  F-statistic:    17.40
Date:            Fri, 06 Jun 2025  Prob (F-statistic):  5.11e-07
Time:            08:33:30  Log-Likelihood:    43.058
No. Observations: 28  AIC:                -68.12
Df Residuals:    19  BIC:                -56.13
Df Model:         8

```

Covariance Type: HC3

	coef	std err	z	P> z	[0.025	0.975]
const	12.0437	1.990	6.465	0.000	8.966	16.768
ln_gdp_centered	0.0498	0.078	0.507	0.612	-0.114	0.194
ln_gdp_centered_sq	-0.0006	0.003	-0.206	0.837	-0.007	0.005
ln_gini	0.3590	0.493	0.688	0.491	-0.626	1.304
ln_unemp	-0.1749	0.087	-1.669	0.075	-0.315	0.025
polstab_centered	-0.0252	0.148	-0.171	0.864	-0.315	0.264
ln_gdp_centered_lag1	-0.0256	0.081	-0.318	0.750	-0.184	0.132
polstab_centered_lag1	0.1076	0.112	0.965	0.335	-0.111	0.326
covid_2020_2021	-0.0253	0.243	-0.063	0.950	-0.492	0.461
Omnibus:	5.068	Durbin-Watson:	1.912			
Prob(Omnibus):	0.079	Jarque-Bera (JB):	5.035			
Skew:	0.033	Prob(JB):	0.0807			
Kurtosis:	5.076	Cond. No.	1.38e+04			

Test RMSE for Quadratic in United Kingdom: 0.2116

2SLS Model Summary for United Kingdom:  
IV2SLS Regression Results

Dep. Variable:	ln_net_migration	R-squared:	0.761
Model:	IV2SLS	Adj. R-squared:	0.716
Method:	Two Stage	F-statistic:	12.52823
	Least Squares	Prob (F-statistic):	0,00015
Date:	Fri, 06 Jun 2025		
Time:	08:33:30		
No. Observations:	28		
Df Residuals:	21		
Df Model:	6		
=====			
	coef	std err	t P> t  [0.025 0.975]
-----			
const	-3.7108	499.962	-0.007 0.994 -1043.438 1036.017
ln_gdp_centered_sq	0.1285	3.900	0.033 0.974 -7.982 8.239
ln_gini	2.6024	68.568	0.038 0.970 -139.992 145.197
ln_unemp	-1.2421	32.964	-0.038 0.970 -69.795 67.311
covid_2020_2021	1.1225	33.963	0.033 0.974 -69.508 71.753
ln_gdp_centered	-0.3842	11.960	-0.032 0.975 -25.256 24.487
polstab_centered	-13.1359	397.314	-0.033 0.974 -839.395 813.125
=====			
Omnibus:	4.190	Durbin-Watson:	2.148
Prob(Omnibus):	0.123	Jarque-Bera (JB):	2.526
Skew:	-0.570	Prob(JB):	0.283
Kurtosis:	3.931	Cond. No.	1.37e+04



Test RMSE for 2SLS in United Kingdom: 0.1410

Processing United States...

Correlation Matrix for United States:

	ln_gdp_centered	ln_gdp_centered_sq	ln_gini \
ln_gdp_centered	1.000000	0.041627	0.628053
ln_gdp_centered_sq	0.041627	1.000000	-0.318295
ln_gini	0.628053	-0.318295	1.000000
ln_unemp	0.061186	-0.117042	-0.240686
polstab_centered	-0.611922	0.282983	-0.491471
ln_gdp_centered_lag1	0.969244	0.149519	0.593417
polstab_centered_lag1	-0.711435	0.262362	-0.502760
covid_2020_2021	0.264391	0.288228	-0.100627

  

	ln_unemp	polstab_centered	ln_gdp_centered_lag1 \
ln_gdp_centered	0.061186	-0.611922	0.969244
ln_gdp_centered_sq	-0.117042	0.282983	0.149519
ln_gini	-0.240686	-0.491471	0.593417
ln_unemp	1.000000	0.080932	0.084732
polstab_centered	0.080932	1.000000	-0.530548
ln_gdp_centered_lag1	0.084732	-0.530548	1.000000
polstab_centered_lag1	0.087249	0.883524	-0.604595
covid_2020_2021	0.147216	-0.391622	0.277284

	polstab_centered_lag1	covid_2020_2021
ln_gdp_centered	-0.711435	0.264391
ln_gdp_centered_sq	0.262362	0.288228
ln_gini	-0.502760	-0.100627
ln_unemp	0.087249	0.147216
polstab_centered	0.883524	-0.391622
ln_gdp_centered_lag1	-0.604595	0.277284
polstab_centered_lag1	1.000000	-0.372740
covid_2020_2021	-0.372740	1.000000

NaN/Inf Check Before Model for United States:

ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0
polstab_centered_lag1	0
covid_2020_2021	0
dtype: int64	
ln_gdp_centered	0
ln_gdp_centered_sq	0
ln_gini	0
ln_unemp	0
polstab_centered	0
ln_gdp_centered_lag1	0

polstab\_centered\_lag1 0  
covid\_2020\_2021 0  
dtype: int64

VIF Results for United States:

	variable	VIF
0	ln_gdp_centered	30.958025
1	ln_gdp_centered_sq	69.109817
2	ln_gini	21.909976
3	ln_unemp	94.560328
4	polstab_centered	5.053493
5	ln_gdp_centered_lag1	25.187658
6	polstab_centered_lag1	7.497052
7	covid_2020_2021	1.901795

OLS Model Summary for United States:

OLS Regression Results

```
=====
Dep. Variable:    ln_net_migration    R-squared:            0.777
Model:            OLS    Adj. R-squared:        0.682
Method:           Least Squares    F-statistic:        5.404
Date:             Fri, 06 Jun 2025    Prob (F-statistic):    0.00118
Time:             08:33:30    Log-Likelihood:        21.539
No. Observations:    28    AIC:                -25.08
Df Residuals:        19    BIC:                -13.09
Df Model:            8
Covariance Type:    HC3
=====
```

```
=====
              coef    std err          z      P>|z|    [0.025    0.975]
-----
const                6.2790     6.261    -1.003    0.014   -18.550     5.992
ln_gdp_centered      -0.0014     0.224   -0.006    0.995    -0.441     0.438
ln_gdp_centered_sq     0.0037     0.003     1.114    0.265    -0.003     0.010
ln_gini               5.4018     1.621     3.333    0.001     2.225     8.578
ln_unemp              0.2278     0.175     1.243    0.214    -0.126     0.561
polstab_centered     -0.1961     0.132    -1.490    0.136    -0.454     0.062
ln_gdp_centered_lag1  0.0022     0.221     0.010    0.992    -0.431     0.435
polstab_centered_lag1 0.0404     0.272     0.148    0.882    -0.493     0.574
covid_2020_2021     -0.6327     0.300    -2.106    0.035    -1.221    -0.044
=====
```

```
=====
Omnibus:            0.974    Durbin-Watson:        2.053
Prob(Omnibus):       0.615    Jarque-Bera (JB):        0.174
Skew:                -0.005    Prob(JB):                0.917
Kurtosis:            3.386    Cond. No.                2.11e+04
=====
```

Test RMSE for OLS in United States: 0.1182

Quadratic Model Summary for United States:

OLS Regression Results

Dep. Variable: ln\_net\_migration R-squared: 0.777  
 Model: OLS Adj. R-squared: 0.682  
 Method: Least Squares F-statistic: 6.4037  
 Date: Fri, 06 Jun 2025 Prob (F-statistic): 0.0318  
 Time: 08:33:30 Log-Likelihood: 21.539  
 No. Observations: 28 AIC: -25.08  
 Df Residuals: 19 BIC: -13.09  
 Df Model: 8  
 Covariance Type: HC3

	coef	std err	z	P> z	[0.025	0.975]
const	-5.1290	6.261	-1.003	0.276	-18.550	5.992
ln_gdp_centered	-0.0014	0.224	-0.006	0.965	-0.441	0.438
ln_gdp_centered_sq	0.0037	0.003	1.114	0.265	-0.003	0.010
ln_gini	5.4718	1.621	3.333	0.001	2.225	8.578
ln_unemp	0.2478	0.175	1.243	0.215	-0.126	0.561
polstab_centered	-0.2161	0.132	-1.490	0.136	-0.454	0.062
ln_gdp_centered_lag1	0.0022	0.221	0.010	0.992	-0.431	0.435
polstab_centered_lag1	0.0404	0.272	0.148	0.882	-0.493	0.574
covid_2020_2021	-0.6527	0.300	-2.106	0.003	-1.221	-0.044

Omnibus: 0.974 Durbin-Watson: 2.023  
 Prob(Omnibus): 0.615 Jarque-Bera (JB): 0.174  
 Skew: -0.005 Prob(JB): 0.917  
 Kurtosis: 3.386 Cond. No. 2.11e+04

Test RMSE for Quadratic in United States: 0.102

#### 2SLS Model Summary for United States: IV2SLS Regression Results

Dep. Variable: ln\_net\_migration R-squared: 0.755  
 Model: IV2SLS Adj. R-squared: 0.685  
 Method: Two Stage F-statistic: 10.89  
 Least Squares Prob (F-statistic): 1.55e-05  
 Date: Fri, 06 Jun 2025  
 Time: 08:33:30  
 No. Observations: 28  
 Df Residuals: 21  
 Df Model: 6

	coef	std err	t	P> t	[0.025	0.975]
const	-4.9424	8.421	-0.587	0.564	-22.455	12.570
ln_gdp_centered_sq	0.0009	0.011	0.074	0.941	-0.023	0.025
ln_gini	5.1454	1.936	2.657	0.015	1.119	9.172
ln_unemp	0.1410	0.331	0.426	0.674	-0.547	0.829
covid_2020_2021	-0.4900	0.523	-0.936	0.360	-1.578	0.599

ln_gdp_centered	0.0043	0.015	0.286	0.778	-0.027	0.035
polstab_centered	0.0328	0.690	0.047	0.963	-1.403	1.469

Omnibus:	0.345	Durbin-Watson:	1.945
Prob(Omnibus):	0.842	Jarque-Bera (JB):	0.005
Skew:	-0.024	Prob(JB):	0.998
Kurtosis:	3.043	Cond. No.	1.93e+04

Test RMSE for 2SLS in United States: 0.0694

Processing complete for all countries.