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*Supplementary File*

# Impact of Foreign Direct Investment and Environmental Regulation on Maritime Sector: Evidence from a Growth Seeking Economy

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## APPENDIX

**Table S1. Descriptive Statistics**

|  | MGDP | ENVR | FDI | GDP |
|---|---|---|---|---|
| Mean | 4.262583 | 3.315789 | 1.268839 | 4.36E+11 |
| Median | 4.225754 | 3.500000 | 0.853396 | 4.80E+11 |
| Maximum | 5.667240 | 3.500000 | 2.900249 | 5.52E+11 |
| Minimum | 3.182963 | 3.000000 | -0.039522 | 2.74E+11 |
| Std. Dev. | 0.635137 | 0.247797 | 0.908525 | 8.77E+10 |
| Skewness | 0.295815 | -0.545545 | 0.454346 | -0.571353 |
| Kurtosis | 2.545323 | 1.297619 | 1.908612 | 1.967491 |
|  |  |  |  |  |
| Jarque-Bera | 0.440765 | 3.236790 | 1.596673 | 1.877714 |
| Probability | 0.802212 | 0.198217 | 0.450077 | 0.391075 |
|  |  |  |  |  |
| Sum | 80.98908 | 63.00000 | 24.10795 | 8.29E+12 |
| Sum Sq. Dev. | 7.261174 | 1.105263 | 14.85751 | 1.38E+23 |
|  |  |  |  |  |
| Observations | 19 | 19 | 19 | 19 |

Note: MGDP-Maritime Sector Gross Domestic Product, ENVR-Environmental Regulation, FDI-Foreign Direct Investment, GDP- Gross Domestic Product

**Table S2.** Unit root test for Maritime Sector Gross Domestic Product

Null Hypothesis: LMGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -1.041743 | 0.7145 |
| Test critical values: | 1% level | -3.857386 |  |
|  | 5% level | -3.040391 |  |
|  | 10% level | -2.660551 |  |

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LMGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -3.022587 | 0.0528 |
| Test critical values: | 1% level | -3.886751 |  |
|  | 5% level | -3.052169 |  |
|  | 10% level | -2.666593 |  |

*MacKinnon (1996) one-sided p-values.

**Table S3.** Unit Root Test for Environmental Regulation

Null Hypothesis: D(ENVR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -2.656845 | 0.1017 |
| Test critical values: | 1% level | -3.886751 |  |
|  | 5% level | -3.052169 |  |
|  | 10% level | -2.666593 |  |

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(ENVR,2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -5.083911 | 0.0011 |
| Test critical values: | 1% level | -3.920350 |  |
|  | 5% level | -3.065585 |  |
|  | 10% level | -2.673460 |  |

*MacKinnon (1996) one-sided p-values.

**Table S4.** Unit Root Test for Foreign Direct Investment

Null Hypothesis: FDI has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=3)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -0.866810 | 0.7731 |
| Test critical values: | 1% level | -3.886751 | |
| | 5% level | -3.052169 | |
| | 10% level | -2.666593 | |

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -6.644282 | 0.0000 |
| Test critical values: | 1% level | -3.886751 | |
| | 5% level | -3.052169 | |
| | 10% level | -2.666593 | |

*MacKinnon (1996) one-sided p-values.

**Table S5.** Unit Root Test for Gross Domestic Product

Null Hypothesis: LGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -4.126363 | 0.0058 |
| Test critical values: | 1% level | -3.857386 |  |
|  | 5% level | -3.040391 |  |
|  | 10% level | -2.660551 |  |

*MacKinnon (1996) one-sided p-values.

**Table S6. Longrun estimates**

Dependent Variable: LMGDP
Method: Least Squares
Date: 12/12/24   Time: 19:36
Sample: 2005 2023
Included observations: 19

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| ENVR | -0.322514 | 0.070965 | -4.544685 | 0.0004 |
| FDI | -0.034368 | 0.031294 | -1.098233 | 0.2894 |
| LGDP | 0.732671 | 0.136629 | 5.362483 | 0.0001 |
| C | -17.06875 | 3.620839 | -4.714031 | 0.0003 |

| | | | |
|---|---|---|---|
| R-squared | 0.903735 | Mean dependent var | 1.439393 |
| Adjusted R-squared | 0.884482 | S.D. dependent var | 0.148873 |
| S.E. of regression | 0.050599 | Akaike info criterion | -2.945112 |
| Sum squared resid | 0.038404 | Schwarz criterion | -2.746283 |
| Log likelihood | 31.97857 | Hannan-Quinn criter. | -2.911463 |
| F-statistic | 46.93983 | Durbin-Watson stat | 1.398213 |
| Prob(F-statistic) | 0.000000 | | |

Note: LMGDP-Maritime Sector Gross Domestic Product, ENVR-Environmental Regulation, FDI-Foreign Direct Investment, LGDP- Gross Domestic Product, L-Log

**Table S7. ECM**

Dependent Variable: D(LMGDP)
Method: Least Squares
Date: 12/12/24   Time: 19:38
Sample (adjusted): 2006 2023
Included observations: 18 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(ENVR) | -0.263767 | 0.071629 | -3.682396 | 0.0028 |
| D(FDI) | -0.020310 | 0.023961 | -0.847645 | 0.4120 |
| D(LGDP) | 0.804386 | 0.460489 | 1.746810 | 0.1042 |
| ECM(-1) | -0.659452 | 0.276961 | -2.381027 | 0.0332 |
| C | -0.001134 | 0.021244 | -0.053370 | 0.9582 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.654662 | Mean dependent var | | 0.032049 |
| Adjusted R-squared | 0.548404 | S.D. dependent var | | 0.074339 |
| S.E. of regression | 0.049957 | Akaike info criterion | | -2.925190 |
| Sum squared resid | 0.032444 | Schwarz criterion | | -2.677865 |
| Log likelihood | 31.32671 | Hannan-Quinn criter. | | -2.891088 |
| F-statistic | 6.161068 | Durbin-Watson stat | | 1.605493 |
| Prob(F-statistic) | 0.005238 | | | |

Note: MGDP-Maritime Sector Gross Domestic Product, ENVR-Environmental Regulation, FDI-Foreign Direct Investment, GDP- Gross Domestic Product, ECM-Error Correction Term

**Table S8. Diagnostics** Variance Inflation Factors (VIF)

Variance Inflation Factors
Date: 12/12/24   Time: 19:41
Sample: 2005 2023
Included observations: 19

| Variable | Coefficient Variance | Uncentered VIF | Centered VIF |
|---|---|---|---|
| ENVR | 0.005036 | 413.0737 | 2.174072 |
| FDI | 0.000979 | 17.38364 | 5.683095 |
| LGDP | 0.018667 | 99361.12 | 6.309807 |
| C | 13.11047 | 97295.08 | NA |

ENVR-Environmental Regulation, FDI-Foreign Direct Investment, LGDP- Gross Domestic Product,

**Table S9.** Serial Correlation

| Breusch-Godfrey Serial Correlation LM Test: | | | |
|---|---|---|---|
| Null hypothesis: No serial correlation at up to 1 lag | | | |

| | | | |
|---|---|---|---|
| F-statistic | 1.407819 | Prob. F(1,14) | 0.2552 |
| Obs*R-squared | 1.736038 | Prob. Chi-Square(1) | 0.1876 |

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 12/12/24   Time: 19:42
Sample: 2005 2023
Included observations: 19
Presample missing value lagged residuals set to zero.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| ENVR | 0.015523 | 0.071231 | 0.217930 | 0.8306 |
| FDI | 0.002291 | 0.030937 | 0.074044 | 0.9420 |
| LGDP | -0.003399 | 0.134839 | -0.025208 | 0.9802 |
| C | 0.036312 | 3.572730 | 0.010164 | 0.9920 |
| RESID(-1) | 0.309600 | 0.260932 | 1.186516 | 0.2552 |
| R-squared | 0.091370 | Mean dependent var | | -5.42E-15 |
| Adjusted R-squared | -0.168238 | S.D. dependent var | | 0.046190 |
| S.E. of regression | 0.049925 | Akaike info criterion | | -2.935667 |
| Sum squared resid | 0.034895 | Schwarz criterion | | -2.687130 |
| Log likelihood | 32.88884 | Hannan-Quinn criter. | | -2.893605 |
| F-statistic | 0.351955 | Durbin-Watson stat | | 1.778258 |
| Prob(F-statistic) | 0.838386 | | | |

**Table S10.** Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

| F-statistic | 1.608549 | Prob. F(3,15) | 0.2293 |
|---|---|---|---|
| Obs*R-squared | 4.624681 | Prob. Chi-Square(3) | 0.2014 |
| Scaled explained SS | 2.480764 | Prob. Chi-Square(3) | 0.4788 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/12/24   Time: 19:43
Sample: 2005 2023
Included observations: 19

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.029234 | 0.185772 | -0.157364 | 0.8771 |
| ENVR | 0.004071 | 0.003641 | 1.118222 | 0.2811 |
| FDI | -0.000309 | 0.001606 | -0.192365 | 0.8500 |
| LGDP | 0.000678 | 0.007010 | 0.096667 | 0.9243 |

| | | | |
|---|---|---|---|
| R-squared | 0.243404 | Mean dependent var | 0.002021 |
| Adjusted R-squared | 0.092085 | S.D. dependent var | 0.002725 |
| S.E. of regression | 0.002596 | Akaike info criterion | -8.884997 |
| Sum squared resid | 0.000101 | Schwarz criterion | -8.686168 |
| Log likelihood | 88.40747 | Hannan-Quinn criter. | -8.851347 |
| F-statistic | 1.608549 | Durbin-Watson stat | 1.928937 |
| Prob(F-statistic) | 0.229265 | | |

Stability test

**Figure S1.** Normality test



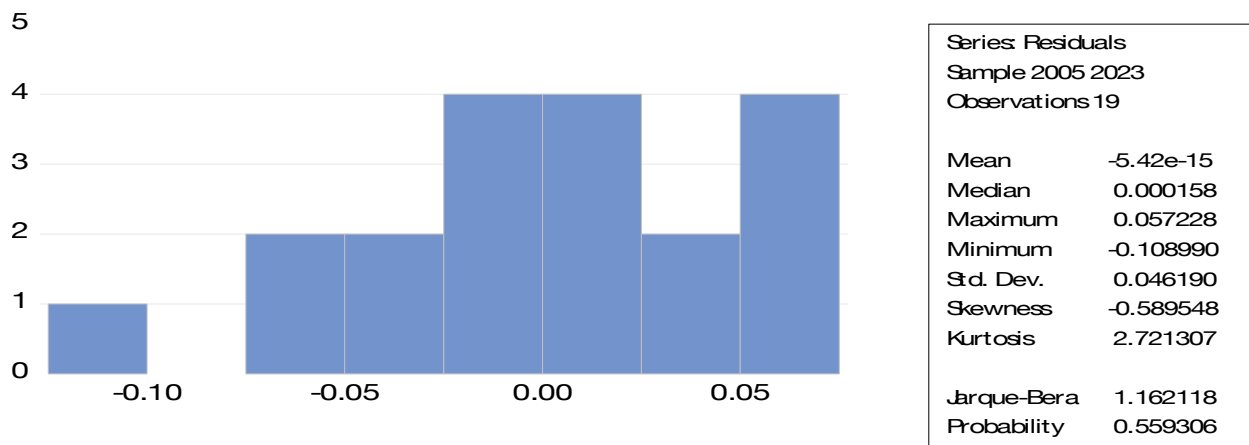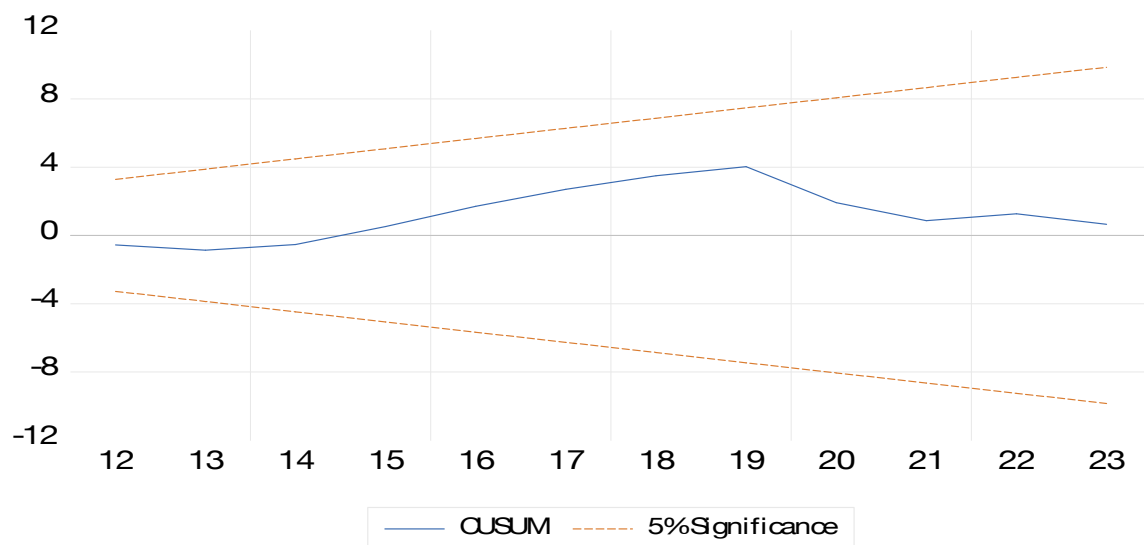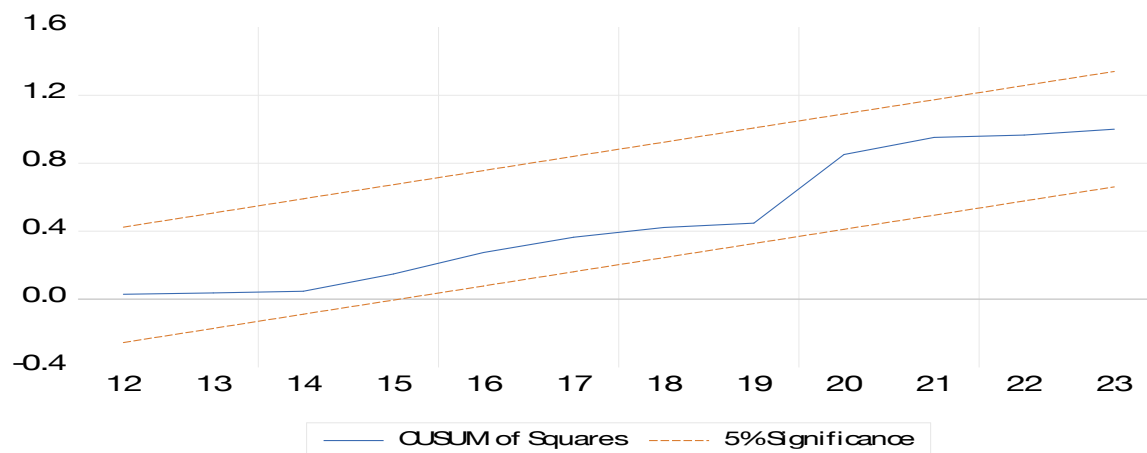**Figure S2.** Cumulative Sum (CUSUM)

**Figure S3.** Cumulative Sum of Squares