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Volatility, island nations and small states

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Abstract

The authors of this paper have attempted to fill a gap in the literature that addresses both domestic and foreign born growth volatility for island countries and small states. Using a sophisticated dynamic panel framework, we find that the characteristics of both types of volatility are considerably different than they are for other countries. Our results argue against the prevailing wisdom regarding volatility that these two groups should simply mimic the economic policies of other nations.

Keywords: volatility; growth; small states; islands

JEL Classification Codes: F02, F42, C10

1. Introduction

The economics literature on island nations and small states¹ is quite large. Topics run the gamut from economic growth, to investment, trade, agriculture, fishing, migration, to tourism (Chen and Singh 2016, Jayaraman et al. 2016, Casey and Hamilton 2014, Schiff 2014, Mahadevan and Asafu-Adjaye 2013, Schiff and Wang 2013, Jayaraman and Lau 2011, Hansen and Headey 2010, Gani and Clemes 2010, Narayan et al. 2010, Chowdhury 2008, Prasad 2008, Seetanah et al. 2008, Kida 2005, Fairbairn 2002). On the subject of growth, there seems to be what we would consider three glaring omissions.

While researchers investigate growth volatility, with few exceptions (e.g., Mapp and Moore 2015, Jackman et al. 2009), they seem to always (i) disregard its dynamics and (ii) pay only cursory statistical attention to how shocks in these nations compare to others. Both of these characteristics are important because they allow administrators to better customize policy prescriptions. At least equally important, however, is the question that (iii) given the size and geographical isolation of these nations relative to others, exactly how much volatility is coming from the rest of the world? Current literature simply lumps all volatility into one broad category,

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¹ Countries with less than one million people which includes the bulk of island nations as well.

regardless of whether it is home grown or foreign born. Policy prescriptions one would use to address internal shocks might be considerably different than policy used to address external shocks, especially for countries with limited resource bases like these small and/or island states.

Small state and island nation researchers have argued that growth volatility is greater in these countries, but Easterly and Kraay (2000) find no evidence that greater volatility translates into greater economic vulnerability. In fact, they state that in general small states "are no different than large states and should receive the same policy advice." We believe this view is somewhat misguided. First, while some small states/islands have high GDP per capita (Chowdhury 2008), there exists some evidence that poverty levels seem to be higher (World Bank 2000), and therefore, should be disproportionally affected by high volatility (de Ferranti et al. 2000). Second, the International Monetary Fund delineates the characteristics that make these nations different: narrow production bases, big governments, poorly integrated financial sectors, fixed exchange rates, and trade openness (Jahan and Wang 2013)—many of these areas are targeted by policy-makers. Hence, if these countries differ from other nations in these areas is it also logical to conclude that their policies should be the same?

To the authors of this paper, it is obvious that there is a gap to fill in the literature regarding growth volatility dynamics and the impact that volatility has in these unique economies relative to those in the rest of of the world.

2. Methods

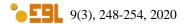
Our model takes the general form

$$Volatility_{it} = a_{i0} + \sum_{g=1}^{5} \sum_{k=1}^{2} (a_{gk} Volatility_{it-k} + b_{gk} World Volatility_{t-k+1}) + e_{it}$$

In words, volatility in country i at time t is regressed on country specific fixed effects, the first and second lag of itself, and current and lagged volatility from the rest of the world; the lag period for each is one year. The lag length for the dependent variable was chosen based upon the statistical significance of the lag itself, while the first two years of world volatility are included simply because any policy response would either be synchronus with current events, or at most, a response to events just passed. The volatility variable(s) are constructed as the natural log of the absolute deviation from the long run growth rate (the long run growth rate is simply the mean growth rate across all available years for that country). Constructing the variable in this way allows for a greater frequency of observations and therefore more data points.² The subscript g represents the country groupings island or small state, and development level. The reader will notice that the variable World Volatility does not have an individual subscript, i, only a time subscript, t. This variable is constructed as the log of the mean level of volatility across all nations that are not in group g, and are not in the island or small states group during time period t. In other words, this is volatility from the rest of the world when the coefficient for group g is being estimated.

Because of the standard endogeneity issues that result from a dynamic panel with fixed effects (Edwards 2014), and because our world volatility measure is possibly endogenous, we exploit a system GMM estimation procedure (Blundell and Bond 1998) that will generate instruments for each. Our conditioning set is small, but is still too large to use an unrestricted GMM method as the number of instruments would quickly grow and over-specification would be an issue

² Edwards JA (e.g., 2016, 2011) is probably the best known for using this proxy for volatility.



(Roodman 2006).³ To circumvent this problem, we create one instrument for each right-hand side variable and lag distance instead of for each variable, lag distance, and time period. We also use a finite-sample correction to the two step covariance matrix by Windmeijer (2005), and test for second-order serial correlation (first-order is expected given the design of the method). A Hansen test will check for independence between the residuals and the lagged and contemporaneous variables. Both Fuller (1996) and Phillips/Perron (1988) tests were used to check for a unit root in volatility, even though the results below indicate that the coefficients on lagged volatility sum to far less than one for all groups. These tests are preferable to other tests as they do not require strongly balanced panels. Both tests return a p-value of 0.000 in all cases, thus rejecting the null that a unit root exists.

3. Data

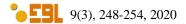
All data comes from the World Bank's World Development Indicators dataset.⁴ To match previous work, the list of small states comes from Easterly and Kraay (2000), while the list of island nations comes from the United Nations' list of Small Island Developing States.⁵ The number of small state countries with available data for this project is thirty, and for islands it is forty-five which includes members and non-members of the UN (see Appendix for listing of each). The panels are unbalanced starting in 1960 and ending in 2017. Since we are comparing GDP growth volatility, and since some island nations have large populations making population level comparisons impossible, we compare our estimates to other countries grouped by development level in terms of average per capita real GDP according to the World Bank: under \$1026 (low), \$1026 to \$4035 (lower middle), \$4036 to \$12475 (upper middle), and over \$12475 (high income).⁶

The question of whether island nations require their own category has been around for several decades. Since 1992, the United Nations Conference on Environment and Development (UNCED) recognize small island developing nations as a special case of small countries--we simply continued with this demarcation. Different from small states, small islands also exhibit little resilience to natural disasters and fragility of their natural environment. Additionally, their small domestic market is heavily dependent upon relatively few external markets, exhibit higher costs for energy, infrastructure, transportation, communication and servicing, in addition to being relatively far from export markets. For these reasons, we study them as a separate group.

4. Results

Table 1 lists the estimates for the first set of regressions for small states and their respective p-values in parentheses. The numbers in the brackets are the p-values comparing the small state estimates to the other groups. Table 2 lists the same for island nations. Statistics in the bottom rows of each table show that our regressions all cover 8332 observations and 204 countries and dependent territories (e.g., British Virgin Islands are not considered a country, but a territory), have 31 instruments each which is well under the number of countries (Roodman 2006), are comprehensively significant as the Wald statistic is quite high, have first order error dependence which is expected (AR(1)), second order error independence which is also expected for a properly specified model (AR(2)), and no feedback from the instruments to the volatility

⁶ We use per capita real GDP instead of GNI like the World Bank, giving us more observations. The two are correlated nearly one-for-one, but GNI has limited availability.



³ The program we use was constructed by David Roodman of the Center for Global Development in Washington, DC, and is not the same program found canned in Stata--this one is more sophisticated and more flexible.

⁴ https://databank.worldbank.org/source/world-development-indicators

⁵ https://sustainabledevelopment.un.org/topics/sids/list

variables with a Hansen p-value well above zero but not close to one (a p-value close to one would indicate overspecification).

What we see in Table 1 is that domestic volatility amongst small states has a memory of roughly two years (the third lag was not significant and is not shown here) unlike the other groups, and the estimate for the second lag is significantly larger than the other groups. We also find that shocks from the rest of the world are slightly more than one-for-one, but only last for one period unlike two of the four income groups, and is also significantly different than three of the four groups.

Table 1. Small States Coefficient Estimates & Comparison P-values.

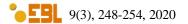
	Small States	Low	Low Middle	Upper Middle	High
Volatility _{it-1}	0.120 ** (0.002)	0.099 ** (0.011) [0.710]	0.205 ** (0.000) [0.076]*	0.062 (0.193) [0.348]	0.175 ** (0.000) [0.273]
Volatility _{it-2}	0.099 ** (0.006)	0.011 (0.747) [0.088]*	0.022 (0.408) [0.087]*	0.014 (0.644) [0.079]*	0.013 (0.688) [0.085]*
$WorldVol_t$	1.115 ** (0.000)	0.820 ** (0.007) [0.400]	0.838 ** (0.002) [0.393]	0.969 ** (0.007) [0.730]	1.542 ** (0.000) [0.207]
$WorldVol_{t\text{-}1}$	0.193 (0.435)	0.794 ** (0.001) [0.004]**	0.537 ** (0.021) [0.082]*	0.076 (0.794) [0.658]	-0.278 (0.285) [0.047]**
# Obs # of I's # Inst	8332 204 31	Wald(20) Wald P	215.97 0.000	AB AR(1) P AB AR(2) P Hansen P	0.000 0.363 0.527

^{*} implies significance at 10%, ** at 5%

Table 2. Island Coefficient Estimates & Comparison P-values.

	Islands	Low	Low Middle	Upper Middle	High
Volatility ₋₁	0.114 ** (0.002)	0.091 ** (0.018) [0.665]	0.225 ** (0.000) [0.016]**	0.068 (0.176) [0.452]	0.163 ** (0.000) [0.298]
Volatility ₋₂	0.047 (0.115)	0.004 (0.888) [0.365]	0.031 (0.294) [0.713]	0.022 (0.507) [0.592]	0.029 (0.422) [0.700]
World Volt	1.221 ** (0.000)	0.680 ** (0.022) [0.154]	0.881 ** (0.001) [0.335]	0.829 ** (0.027) [0.394]	1.312 ** (0.000) [0.804]
World Vol _{t-1}	0.213 (0.360)	0.754 ** (0.001) [0.008]**	0.421 * (0.083) [0.302]	0.082 (0.779) [0.628]	-0.190 (0.453) [0.074]*
# Obs # of I's # Inst	8332 204 31	Wald(20) Wald	194.53 0.000	AB AR(1) AB AR(2) Hansen	0.000 0.547 0.718

^{*} implies significance at 10%, ** at 5%



The Island estimates in Table 2 tell a slightly different story. Domestic volatility has a memory of roughly one year, which is the same as three other groups, even though significantly higher than upper middle income countries. Contemporaneous world volatility affects island countries by about one-tenth more than Small States, but again, the memory is only for one year, which is significantly different than two of the four other groups.

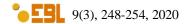
The longer memory result in small countries is interesting. As argued above, in general, small nations might be more prone to volatility shocks due to their narrow productions bases, big governments, financial systems, etc. Under this framework, however, it is entirely possible that the land-locked nature of many small states, as opposed to small island nations, places them in a position of being a recipient of lingering volatility from nations directly abutting theirs. This spillover effect would likely not be as pronounced in island countries simply because of their oceanic buffer.

5. Concluding remarks

The authors of this paper have attempted to fill a gap in the literature that addresses real GDP growth volatility for both island countries and small states. Using a more sophisticated form of the popular dynamic panel GMM estimation technique that takes into consideration the number of instruments relative to the number of countries, thus limiting possible bias in the estimators, we find considerable difference in both domestic volatility dynamics and how external shocks affect these groups of countries relative to others. Specifically, we find that mimicking international policy addressing cycles in growth volatility are better suited for islands, but not for small states, while policy addressing the impact from external shocks should should be highly customized for each group.

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Appendix A – List of countries

Islands (United Nations SIDS List)

Aruba

American Samoa Antigua and Barbuda

Bahrain Bahamas, The Belize Bermuda Barbados Comoros Cabo Verde Cuba

Dominican Republic

Fiii

Dominica

Micronesia, Fed. Sts. Guinea-Bissau Grenada Guam Guyana Haiti Jamaica

St. Kitts and Nevis

St. Lucia Maldives

Kiribati

Marshall Islands

Northern Mariana Islands

Mauritius Nauru Palau

Papua New Guinea

Puerto Rico
Singapore
Solomon Islands
Sao Tome and Principe

Suriname Seychelles Timor-Leste Tonga

Trinidad and Tobago

Tuvalu

St. Vincent and the Grenadines

Virgin Islands (U.S.)

Vanuatu Samoa Small States (Easterly and Kraay (2000))

Antigua and Barbuda

Bahrain
Bahamas, The
Belize
Bermuda
Barbados
Comoros
Cabo Verde
Cyprus
Djibouti
Fiji
Gabon
Gambia, The
Guinea-Bissau

Grenada

Guyana

Iceland St. Kitts and Nevis

St. Lucia
Luxembourg
Maldives
Malta
Mauritius
Oatar

Solomon Islands

Suriname Seychelles

St. Vincent and the Grenadines

Vanuatu Samoa