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REPLICATION STUDY:
Toya and Skidmore (Economics Letters, 2007)

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Abstract: This study replicates the empirical findings of Toya and Skidmore (2007), hereinafter "TS", and performs a variety of robustness checks. We are able to exactly replicate the findings reported by TS. Our robustness checks consist of two parts. Firstly, we update TS's original data set, both with respect to variable values and years. We then address a number of estimation issues: (i) truncation bias, (ii) the effect of severe skewness in the disaster data, (iii) fixed effects, and (iv) the omission of a time trend. Our robustness checks produce two major results: We confirm TS's finding that income is negatively related to both fatalities and economic losses from disasters. In fact, we estimate coefficients that are substantially larger than TS. On the other hand, we find no evidence to indicate that the other economic development variables (educational attainment, size of government, economic openness, financial sector development) are statistically related to either fatalities or economic damages.

Keywords: Economic development; Natural disasters, Replication study

JEL Classifications: O1, Q54, C1

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REPLICATION STUDY:
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I. Introduction.

This paper replicates and performs robustness checks on Toya and Skidmore (2007), henceforth TS. TS investigate the extent to which the impact of natural disasters is mitigated by economic development. In addition to confirming that national income is an important determinant in reducing deaths and damages from natural disasters, TS find that higher educational attainment, greater economic openness, a strong financial sector and smaller government are also important.

Interest in natural disasters has increased due to the scope of recent weather events such as Hurricane Sandy in the US and Japan's tsunami in 2011. Policymakers are interested in learning more about what can be done to lessen the associated adverse consequences. Within this context, TS has been an influential contribution to the literature. It has been cited over 30 times in Web of Science as of January 2013. For these reasons, this study is interested in replicating TS and determining the extent to which its findings are robust.

Overview of TS. TS investigate two measures of impact from natural disasters: (i) disaster-related deaths, and (ii) dollar value of economic damages as a share of GDP. While we investigate both sets of results, we focus on deaths because the data are more reliable. TS take their data from the OFDA/CRED International Disaster Database (EM-DAT, 2004). Their sample includes observations from every recorded natural disaster in 151 countries over the years 1960–2003. OFDA/CRED define a natural disaster as any event in which "ten or more people [were] killed, 100 or more people were affected/injured/homeless, significant damages were incurred, a declaration of a state of emergency and/or an appeal for international assistance [was made]" (TS, page 21).

TS's main findings center on pooled OLS regressions of the following form:

$$(1) \quad deaths_{jit}/damages_{jit} = \beta_0 + \beta_1\, pcgdp_{it} + \beta_2\, hc_{it} + \beta_3\, open_{it} + \beta_4\, fin_{it} + \beta_5\, gov_{it} + \beta_n\, z_{it} + e_{jit}$$

where $deaths_{jit}$ ($damages_{jit}$) is the log of the total number of disaster-related deaths (the log of the ratio of economic damages to GDP) associated with disaster j in country i at time t; $pcgdp$

is the log of real per capita GDP; *hc* measures educational attainment (total years of schooling attainment in the population aged 15 and over); *open* measures economic openness ([exports+imports]/GDP); *fin* measures the development of the financial sector (M3/GDP); *gov* measures the size of the government sector (government consumption/GDP); *z* is a vector of control variables consisting of log of population, log of land area, and dummy variables for disaster type; and *e* is an error term.

TS estimate Equation (1) for an aggregated sample of OECD and developing countries, as well as for each of the two subsamples. Note that a country *i* can experience more than one disaster-event *j* in year *t*, and that there may be multiple years when a country experiences no disaster events.

Overview of replication methodology. TS graciously provided the original data used in their study. Using these data, we were able to exactly replicate their published results. The first robustness check consisted of updating all variable values and extending the data set to include the most recent data available (2009). We then investigated the robustness of the results to two estimation procedures. Firstly, we employed interval regression to address concerns about truncation bias and severe skewness in the distribution of deaths and damages. Secondly, we reestimated the main equations using fixed effects. Given the length of the sample period, we also included a time trend variable. At several points during the replication process we liaised with the authors to get answers to data questions and receive feedback regarding our analysis of their study.

Sample characteristics. While TS do not report sample characteristics, it is useful to describe their data in more detail. From TABLE 1 we see that developing countries suffer greater disaster-related deaths per event, have lower incomes and educational achievement, larger government sectors, greater openness, and their financial sectors are less developed. While not reported in TABLE 1, they also suffer greater economic damages (as measured as a share of GDP).

TABLE 2 reports the distribution of deaths per disaster. The distribution of deaths is heavily skewed towards fewer deaths: approximately 60 percent of disasters in OECD countries, and 40 percent in developing countries, are associated with 20 or fewer deaths. While only a small percent of disasters have more than 1000 deaths, in a very few cases the number of deaths is extremely large, exceeding 100,000. While not reported, the distribution of economic damages displays similar skewness.

This brief description of TS's data highlight two econometric issues: Firstly, there is truncation bias because many disasters are not included in the sample. Given that developed countries are more likely to prevent disaster-related deaths, we should expect the estimated effects of variables associated with economic development (e.g. income, education, financial development, etc.) to be biased towards zero. Secondly, the existence of a large number of observations with very few deaths, and a few observations with extremely large numbers of deaths, suggests that one should be careful that the results are not disproportionately influenced by observations at either end of the distribution. As described below, the use of interval regression will help address both issues.

2. Replication of Toya and Skidmore (2007) Study.

We first demonstrate that we are able to replicate TS's results. In this we are greatly indebted to the authors for making their original data available to us. Consequently, replication is straightforward, and exact, as demonstrated by TABLE 3.

These results (particularly those for ALL COUNTRIES) form the basis of TS's main conclusion: "The contribution of this paper is to show that income is not the only important measure of development in reducing disaster related deaths and damages/GDP. Rather, higher educational attainment, greater openness, a strong financial sector and smaller government are also important" (TS, page 24).

3. Robustness Checks.

Part I. The first robustness check consists of investigating whether TS's results are sustained when the data are updated. We used the same sources from which TS drew their data (Barro, 2010; CRED, 2012; Heston, Summers, and Aten, 2011; International Monetary Fund, 2011; The World Bank Group, 2012). In doing so, we learned that some of the disaster observations from the OFDA/CRED database that were available to TS were dropped from the most recent version of the OFDA/CRED database.

Column (2) of TABLE 4A reestimates Equation (1) for the ALL COUNTRIES sample using these updated data. In order to compare like-to-like, we also reestimate Equation (1) with the TS data, but only include disaster observations currently available in the OFDA/CRED database. In other words, we use TS's original data values, but select the observations to be identical to the observations used in Column (2). These latter results are reported in Column (1) for comparison's sake.

With the exception of income, all of the variables retain their sign and statistical significance. The income variable decreases in size by approximately a third (from -0.152 in the original study, to -0.098 using the updated data), and drops to statistical insignificance. A comparison of Columns (2) and (1) confirms that this change is not due to sample differences, but rather to updated values for the variables. Almost all of the differences between these columns can be attributed to changes in the values of two variables: *Total Schooling Years* and *Size of Government*.[1]

TABLES 4B and 4C repeat the exercise for the OECD and DEVELOPING COUNTRIES samples. Other than the aforementioned income result for DEVELOPING COUNTRIES, these results largely confirm TS's original findings with one interesting reversal: *Size of Government* is positive and significant in TS's original findings for OECD COUNTRIES. In contrast, its estimated coefficient is insignificant using the updated data. Conversely, *Size of Government* is positive and insignificant in TS's original findings for DEVELOPING COUNTRIES, but we estimate its effect to be much larger and statistically significant using the updated data.

The original study by TS, and the results from Column (2) of TABLES 4A-4C, use data from 1960 to 2003. Column (3) reports the results of updating the data to include all disasters through the end of calendar year 2009. This results in the addition of 10 to 20 percent more observations. A comparison of Column (3) with Column (2) finds no change in the statistical significance of the variables when the dataset is extended to include more recent years.

In summary, while most of TS's original findings are confirmed using updated data, there are two notable differences: Firstly, the estimated negative effect of income on disaster-related

1. Differences in the estimated coefficients reported in Columns (1) and (2) are due to updated values of the respective variables. Other than that, the two samples are identical. In this context, it is noteworthy that the variable that changes the most from updating is the educational attainment variable (cf. Appendix 1). Further, while we don't report the results, we can demonstrate that when the estimating equation from Column (2) replaces the updated variables values for the two variables (i) *Total Schooling Years* and (ii) *Size of Government* with their original values, we obtain results virtually identical to Column (1). This demonstrates that differences in Columns (2) and (1) results are due entirely to updated values for these two variables.

fatalities is smaller and insignificant, and this result is driven primarily by the DEVELOPING COUNTRIES sample (cf. Columns (3) and (1) in Tables 4A-4C). Secondly, while the estimated effect of *Size of Government* on fatalities is similar in the ALL COUNTRIES sample, there are substantial differences in the two subsamples.

Part II. This section checks robustness across a number of econometric and specification issues. As noted above, two econometric concerns with TS are (i) truncation, and (ii) skewness in the dependent variable. If economic development variables are successful in mitigating loss of life from natural disasters, then these events may be omitted from the disaster sample. This will cause the impact of economic development variables to be underestimated.

There exist empirical treatments for truncation bias. Unfortunately, they cannot be implemented in our study because there are no defined threshold values below which observations are excluded from the data set. As noted above, OFDA/CRED define a natural disaster as any event in which there were "ten or more people killed, 100 or more people were affected/injured/homeless, significant damages were incurred, a declaration of a state of emergency and/or an appeal for international assistance." Even so, there are hundreds of observations for which the number of fatalities is less than 10. This illustrates the difficulty with identifying a threshold value for determining which disasters to include the sample. As a result, truncation estimation procedures cannot be implemented.

At the other end of the distribution, some observations have exceptionally large fatalities/damages associated with them. From TABLES 1 and 2, we see that there are 86 observations for which the number of fatalities is greater than a 1000. Sixteen of these have 10,000 or more fatalities, with the maximum number of deaths associated with a single natural disaster being 138,865. In least squares regression, exceptionally large values can substantially impact regression estimates, even if they represent only a small percent of the total sample size.

We address these twin problems by implementing an interval regression procedure. The nature of truncation bias is that observations with positive error terms are disproportionately sampled. Treating low-valued observations as censored "allows" these observations to potentially take more negative values. This mitigates truncation bias. On the other side, treating high-valued observations as censored allows large disasters to be included in the sample, but mitigates the disproportionate impact due to their exceptionally large values. In our analysis, disaster observations having either 10 or fewer deaths, or 500 or more deaths, are considered censored at the respective threshold values. This results in approximately 30% of the observations at the lower end of the fatality distribution, and approximately 5% of the observations at the upper end, being categorized as censored. While somewhat adhoc, interval regression is arguably an improvement on an OLS estimation procedure that ignores these problems. We note that in the absence of problems (i) and (ii), both OLS and interval regression produce consistent coefficient estimates.

Another issue concerns the lack of a time trend in TS. The TS study covers 30-plus years of disasters, and our extended dataset updates this to include 40 years of data. One would expect increases in the technology of disaster preparedness and response to improve over time. To address this issue, we include a time trend variable in the subsequent empirical analyses.

Finally, we investigate the robustness of TS's findings to the inclusion of fixed effects. As noted by TS, "Policymakers engaged in preparedness may find it useful to know the number of lives that are likely to be saved as a result of development" (TS, page 24). In this respect, fixed effects may give a more accurate estimate of the likely impact of policy changes for a given country because they isolate "within-country" variation. The effects of past changes in income within a country over time may give a better picture to policymakers of how future changes in income could mitigate disaster-related deaths. A similar argument holds for the non-income variables.

The first column of TABLES 5A-5C reports the original TS results. The subsequent columns report the results of our robustness checks. All of the estimating equations take as their starting point the updated sample of 3544 observations utilized in Column (3) of TABLES 4A-4C. The second column of TABLES 5A-5C reports the results of interval regression. This specification also adds a linear time trend to the previous set of explanatory variables. As many of the countries in our dataset had only one, or a few, natural disasters during the years of observation, we did not include fixed effects in this estimating equation. The final two columns of TABLES 5A-5C s report fixed effect, OLS regressions with either a minimum of 5 or 10 observations per country. Observations from countries having less than 5/10 disasters during the forty-year sample period were omitted from these respective samples. The fixed effects OLS regressions also include a linear time trend.[2] Unless otherwise noted, all standard errors used estimators that accounted for robust forms of within-country serial correlation and country-specific heteroskedasticity.

The main findings from TABLES 5A-5C are easily summarized. None of the economic development variables are statistically significant at the 5 percent level across any of the samples and estimating equations. Income is the only variable that is consistently estimated with the same sign (negative).

A closer look at the effect of the time trend variable and fixed effects on the estimated impact of income. A statistically significant, negative relationship between disaster-related fatalities and national income has been reported by many researchers. While we also estimate a negative effect, we find that income is statistically insignificant. We want to better understand why our results are different. Is it the fixed effects, the time trend, the truncation bias, the skewness in the dependent variable, or some combination of these?

TABLE 6 repeats the estimation procedures of TABLE 5A (the ALL COUNTRIES sample), with the goal of identifying the responsible factors. The first three columns employ interval regression. The next two use fixed effects OLS. To identify the impact of sample differences, we consider three samples: (i) all observations, (ii) only those observations for which 5 or more disasters are observed for each country, and (iii) only those observations for which 10 or more disasters are observed for each country.

The first row of TABLE 6 uses the same variable specification as TS's original study, which we call the Base Specification (BS). The second row uses this specification plus a linear time trend. The third row uses the Base Specification and adds country fixed (FEs) rather than a time trend. The last row uses the Base Specification plus both a linear time trend and country FEs. Each cell reports the corresponding estimates for the income variable, *Ln(GDP per Capita).*

TABLE 6 reveals much similarity in the estimated coefficients and corresponding t-statistics across any given row. This suggests that using interval regression or fixed effects OLS has relatively little bearing on the final results. In every case, the inclusion of either a linear time trend or fixed effects increases the estimated impact of income. It is only when a linear time

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2. While not reported, the time trend variable was negative and highly significant in all of the respective estimating equations.

trend and fixed effects are both added that the estimated effect of income diminishes and becomes statistically insignificant.

The reason why the income variable diminishes in size and statistical significance when both fixed effects and a time trend are included is due to extreme multicollinearity. When income is regressed on the other explanatory variables, the associated R-squareds range between 0.95 and 0.99, depending on the sample.[3] This severe multicollinearity eliminates virtually all of the independent information provided by the income variable. As a result, we view the second and third rows of TABLE 6 as more indicative of the true relationship between income and fatalities. We conclude that our results confirm the original findings of TS with respect to income. In fact, we estimate a larger impact than TS. TS report that a 10 percent increase in income is associated with a 1.5 percent decrease in fatalities. Based upon TABLE 6, we estimate a relationship that is several times larger than that. On the other hand, we do not find evidence that the other economic development variables are statistically related to disaster deaths. A variable-specific summary of these results is provided in the first column of TABLE 8.

The effect of economic development variables on disaster-related damages. TABLES 7A-7C repeat the analyses of TABLES 5A-5C when the dependent variable is economic damages, *Ln(Damages/GDP)*. TS note that the OFDA/CRED data on damages suffer from a number of deficiencies that limit their reliability (cf. TS, page 22). We report our associated empirical findings with this caveat in mind.

Our robustness checks produce results that are similar to TS's original findings with two exceptions; one major, one relatively minor. Firstly, we consistently estimate a negative impact of national income on disaster-related economic damages. The estimated impacts are substantially larger in size than TS, and often statistically significant, even when they were not significant in the original TS study. For example, using the ALL COUNTRIES sample, TS report that a 10 percent increase in income is associated with a 1.15 percent decrease in the ratio of Damages to GDP (though their estimate is not statistically significant). In contrast, we estimate coefficients that are more than an order of magnitude larger (cf. TABLE 7A).[4]

3. The associated results are available from the authors by request.
4 Unlike for fatalities, multicollinearity of the income variable with the time trend and country fixed effects does not appear to constitute a serious problem in the estimating equations for economic damages (cf. Appendix 2).

The other difference worth noting is that we generally estimate a negative coefficient on *Size of Government*, opposite to what TS report, and contrary to our previously-reported findings for fatalities. However, too much should not be made of this finding, given that the respective coefficients for *Size of Government* are statistically insignificant in every instance. The main findings from TABLES 7A-7C are summarized in the second column of TABLE 8.

4. Conclusion.

This study replicates the empirical findings of Toya and Skidmore (2007), henceforth TS, and performs a variety of robustness checks. We were able to exactly replicate the findings reported by TS. Our robustness checks consisted of two parts. Firstly, we updated TS's original data set, both with respect to variables values and years. We then addressed a number of estimation issues: (i) truncation bias, (ii) the effect of severe skewness in the disaster data, (iii) fixed effects, and (iv) the omission of a time trend in the original study.

On the basis of these results, we confirm TS's finding that income is negatively related to both fatalities and economic losses from disasters. In fact, we estimate coefficients that are substantially larger than TS. On the other hand, we find no evidence to indicate that the other economic development variables (educational attainment, size of government, economic openness, financial sector development) are statistically related to either fatalities or economic damages.

How does our analysis affect TS's conclusions? They write (page 24):

> "The contribution of this paper is to show that income is not the only important measure of development in reducing disaster deaths and damages/GDP. Rather, higher educational attainment, greater openness, a strong financial sector and smaller government are also important. Policymakers engaged in preparedness may find it useful to know the number of lives that are likely to be saved as a result of development. Importantly, some economic development factors are, to some degree, within the control of policymakers. In addition to more direct disaster mitigation efforts, long-run disaster reduction policies might to include efforts to improve education, increase openness and further develop financial markets."

Our findings suggest that policy-makers should not focus on non-income, economic development factors when it comes to disaster mitigation. Rather, they suggest that improving national income is the surest way to reduce fatalities and economic losses associated with natural disasters.

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TABLE 1
Description of Toya and Skidmore's (2007) Original Data.

			Dataset = ALL COUNTRIES			
Variable	Observations	Mean	Median	Std. Dev.	Min.	Max.
Number of Deaths	3210	289.612	25	3136.824	1	138865
GDP per Capita	3210	6996.321	3694.314	7927.806	330.276	33308.240
Total Schooling Years	3210	5.783	5.289	2.781	0.150	12.049
Size of Government	3210	0.186	0.172	0.073	0.054	0.517
Openness	3210	0.489	0.341	0.297	0.048	3.096
M3/GDP	3210	0.531	0.433	0.375	0.057	2.370
			Dataset = OECD COUNTRIES			
Variable	Observations	Mean	Median	Std. Dev.	Min.	Max.
Number of Deaths	588	56.456	14.000	302.599	1	5297
GDP per Capita	588	21498.070	21516.600	7022.185	4656.875	33308.240
Total Schooling Years	588	10.015	10.344	1.891	4.875	12.049
Size of Government	588	0.121	0.126	0.040	0.054	0.257
Openness	588	0.247	0.211	0.159	0.072	1.175
M3/GDP	588	0.831	0.665	0.414	0.224	1.996

Dataset = DEVELOPING COUNTRIES						
Variable	Observations	Mean	Median	Std. Dev.	Min.	Max.
Number of Deaths	2622	341.899	29	3465.787	1	138865
GDP per Capita	2622	3744.214	3076.353	2854.266	330.276	26703.230
Total Schooling Years	2622	4.834	4.866	1.936	0.150	10.837
Size of Government	2622	0.200	0.192	0.071	0.054	0.517
Openness	2622	0.457	0.390	0.307	0.048	3.096
M3/GDP	2622	0.464	0.370	0.331	0.057	2.370

NOTE: The number of observations for each of the samples corresponds to the number of observations used in TS's original regressions where multiple economic development variables are included (cf. Tables 1-3 in TS).

TABLE 2
Distribution of Fatalities in Toya and Skidmore's (2007) Original Data.

Number of Deaths	Number of observations	Percent of total
Dataset = ALL COUNTRIES		
Number of Deaths	Number of observations	Percent of total
1-10	939	29.25
11-20	499	15.55
21-100	1133	35.26
101-1000	553	16.92
1001-	86	3.02
Total Observations	3210	---
Dataset = OECD COUNTRIES		
Number of Deaths	Number of observations	Percent of total
1-10	243	41.33
11-20	109	18.54
21-100	182	30.95
101-1000	51	8.67
1001-	3	0.51
Total Observations	588	---
Dataset = DEVELOPING COUNTRIES		
Number of Deaths	Number of observations	Percent of total
1-10	696	26.54
11-20	390	14.87
21-100	951	36.27
101-1000	502	19.15
1001-	83	3.17
Total Obesrvations	2622	---

NOTE: The number of observations for each of the samples corresponds to the number of observations used in TS's original regressions where multiple economic development variables are included (cf. Tables 1-3 in TS).

TABLE 3
Replication of Toya and Skidmore's (2007) Original Results (Fatalities).

Variables	Countries = ALL		Countries = OECD		Countries = DEVELOPING	
	Original	Replication	Original	Replication	Original	Replication
Ln(GDP per Capita)	-0.152 (-2.22)	-0.152 (-2.22)	-1.533 (-5.37)	-1.533 (-5.37)	-0.166 (-2.16)	-0.166 (-2.16)
Total Schooling Years	-0.092 (-4.28)	-0.092 (-4.28)	0.002 (0.03)	0.002 (0.03)	-0.079 (-3.06)	-0.079 (-3.06)
Size of Government	0.978 (1.88)	0.978 (1.88)	6.824 (4.09)	6.824 (4.09)	0.319 (0.58)	0.319 (0.58)
Openness	-0.820 (-6.27)	-0.820 (-6.27)	-0.830 (-1.50)	-0.830 (-1.50)	-0.611 (-3.53)	-0.611 (-3.53)
M3/GDP	-0.364 (-3.50)	-0.364 (-3.50)	0.260 (1.12)	0.260 (1.12)	-0.456 (-3.05)	-0.456 (-3.05)
Observations	3210	3210	588	588	2622	2622
Adjusted R^2	0.154	0.154	0.334	0.334	0.112	0.112

NOTE: Original results are taken from Tables 1-3 in TS. The dependent variable is *Ln(Deaths)*. Estimates derived from OLS estimation of Equation (1) in text. Numbers in parentheses are t-values based on the White (1980) heteroskedasticity-consistent covariance matrix. Other explanatory variables not reported here are *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type.

TABLE 4A
Checking for Robustness (Fatalities) – Part I.

Dataset = ALL COUNTRIES				
Variables	Original	Using comparable observations (1)	Using updated data (2)	Extending dataset to 2009 (3)
Ln(GDP per Capita)	-0.152 (-2.22)	-0.158 (-2.23)	-0.097 (-1.43)	-0.095 (-1.52)
Total Schooling Years	-0.092 (-4.28)	-0.094 (-4.27)	-0.115 (-5.34)	-0.129 (-6.33)
Size of Government	0.978 (1.88)	1.148 (2.08)	1.591 (3.07)	1.397 (2.92)
Openness	-0.820 (-6.27)	-0.794 (-5.68)	-0.724 (-5.23)	-0.710 (-5.85)
M3/GDP	-0.364 (-3.50)	-0.328 (-2.96)	-0.330 (-3.03)	-0.291 (-3.06)
Observations	3210	3053	3053	3544
Adjusted R^2	0.154	0.154	0.157	0.166

NOTE: The dependent variable is *Ln(Deaths)*. Estimates derived from OLS estimation of Equation (1) in text. Numbers in parentheses are t-values based on the White (1980) heteroskedasticity-consistent covariance matrix. Other explanatory variables not reported here are *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type. Column (1) uses the original TS data, but deletes observations not included in the current OFDA/CRED database. Column (2) updates the values of the respective explanatory variables, using the same observations as Column (1). Column (3) extends the sample from 2006 to 2009.

TABLE 4B
Checking for Robustness (Fatalities) – Part I.

Dataset = OECD COUNTRIES				
Variables	Original	Using comparable observations (1)	Using updated data (2)	Extending dataset to 2009 (3)
Ln(GDP per Capita)	-1.533 (-5.37)	-1.543 (-5.39)	-1.722 (-6.03)	-1.596 (-5.75)
Total Schooling Years	0.002 (0.03)	0.001 (0.01)	-0.063 (-1.08)	-0.073 (-1.28)
Size of Government	6.824 (4.09)	6.594 (3.94)	1.907 (1.30)	1.733 (1.35)
Openness	-0.830 (-1.50)	-0.808 (-1.48)	-0.672 (-1.14)	-0.747 (-1.32)
M3/GDP	0.260 (1.12)	0.262 (1.11)	0.066 (0.31)	-0.062 (-0.36)
Observations	588	584	584	708
Adjusted R^2	0.334	0.324	0.313	0.289

NOTE: The dependent variable is *Ln(Deaths)*. Estimates derived from OLS estimation of Equation (1) in text. Numbers in parentheses are t-values based on the White (1980) heteroskedasticity-consistent covariance matrix. Other explanatory variables not reported here are *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type. Column (1) uses the original TS data, but deletes observations not included in the current OFDA/CRED database. Column (2) updates the values of the respective explanatory variables, using the same observations as Column (1). Column (3) extends the sample from 2006 to 2009.

TABLE 4C
Checking for Robustness (Fatalities) – Part I.

Dataset = DEVELOPING COUNTRIES				
Variables	Original	Using comparable observations (1)	Using updated data (2)	Extending dataset to 2009 (3)
Ln(GDP per Capita)	-0.166 (-2.16)	-0.165 (-2.05)	-0.090 (-1.17)	-0.083 (-1.20)
Total Schooling Years	-0.079 (-3.06)	-0.085 (-3.17)	-0.106 (-4.12)	-0.125 (-5.27)
Size of Government	0.319 (0.58)	0.439 (0.74)	1.336 (2.41)	1.340 (2.56)
Openness	-0.611 (-3.53)	-0.608 (-3.27)	-0.536 (-2.96)	-0.600 (-3.73)
M3/GDP	-0.456 (-3.05)	-0.381 (-2.29)	-0.434 (-2.69)	-0.295 (-2.00)
Observations	2622	2469	2469	2836
Adjusted R^2	0.112	0.108	0.112	0.125

NOTE: The dependent variable is *Ln(Deaths)*. Estimates derived from OLS estimation of Equation (1) in text. Numbers in parentheses are t-values based on the White (1980) heteroskedasticity-consistent covariance matrix. Other explanatory variables not reported here are *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type. Column (1) uses the original TS data, but deletes observations not included in the current OFDA/CRED database. Column (2) updates the values of the respective explanatory variables, using the same observations as Column (1). Column (3) extends the sample from 2006 to 2009.

TABLE 5A
Checking for Robustness (Fatalities) – Part II.

Dataset = ALL COUNTRIES				
Variables	TS	Interval Regression – Pooled	Fixed Effects OLS	
			$N \geq 5$	$N \geq 10$
Ln(GDP per Capita)	-0.152 (-2.22)	-0.335 (-1.94)	-0.053 (-0.25)	-0.079 (-0.36)
Total Schooling Years	-0.092 (-4.28)	-0.083 (-1.90)	0.042 (0.60)	0.054 (0.77)
Size of Government	0.978 (1.88)	0.212 (0.15)	0.822 (0.70)	0.773 (0.64)
Openness	-0.820 (-6.27)	-0.211 (-0.68)	0.267 (1.32)	0.243 (1.17)
M3/GDP	-0.364 (-3.50)	-0.289 (-1.43)	-0.166 (-0.80)	-0.105 (-0.49)
Observations	3210	3544	3474	3354
Countries		103	69	50
Adjusted R^2	0.154	---	0.102	0.102

NOTE: The dependent variable is *Ln(Deaths)*. The first column repeats the original findings from TS, previously reported in TABLE 3. The second column estimates the same specification using interval regression, where observations are categorized as censored whenever the number of disaster-related fatalities was 10 or less, or 500 or more. The third and four columns are fixed effects OLS regressions where observations are included only if the associated country has either (i) 5 or more ($N \geq 5$), or (ii) 10 or more ($N \geq 10$) disaster-events during the respective time period. All four estimating equations include *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type. The latter three estimating equations also include a linear time trend. Numbers in parentheses are t-values based on cluster-robust standard errors (robust to country-specific serial correlation and heteroskedasticity).

TABLE 5B
Checking for Robustness (Fatalities) – Part II.

Dataset = OECD COUNTRIES				
Variables	TS	Interval Regression – Pooled	Fixed Effects OLS	
			$N \geq 5$	$N \geq 10$
Ln(GDP per Capita)	-1.533 (-5.37)	-0.122 (-0.26)	-0.279 (-0.58)	-0.184 (-0.41)
Total Schooling Years	0.002 (0.03)	0.081 (0.89)	-0.072 (-0.89)	-0.064 (-0.79)
Size of Government	6.824 (4.09)	2.891 (1.00)	2.674 (1.50)	2.775 (1.52)
Openness	-0.830 (-1.50)	1.045 (0.87)	0.245 (0.15)	0.649 (0.39)
M3/GDP	0.260 (1.12)	0.348 (1.28)	0.085 (0.48)	0.049 (0.39)
Observations	588	708	696	675
Countries		15	10	7
Adjusted R^2	0.334	---	0.260	0.260

NOTE: The dependent variable is *Ln(Deaths)*. The first column repeats the original findings from TS, previously reported in TABLE 3. The second column estimates the same specification using interval regression, where observations are categorized as censored whenever the number of disaster-related fatalities was 10 or less, or 500 or more. The third and four columns are fixed effects OLS regressions where observations are included only if the associated country has either (i) 5 or more ($N \geq 5$), or (ii) 10 or more ($N \geq 10$) disaster-events during the respective time period. All four estimating equations include *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type. The latter three estimating equations also include a linear time trend. Numbers in parentheses are t-values based on cluster-robust standard errors (robust to country-specific serial correlation and heteroskedasticity).

TABLE 5C
Checking for Robustness (Fatalities) – Part II.

Dataset = DEVELOPING COUNTRIES				
Variables	TS	Interval Regression – Pooled	Fixed Effects OLS	
			N ≥ 5	N ≥ 10
Ln(GDP per Capita)	-0.166 (-2.16)	-0.230 (-1.19)	-0.096 (-0.41)	-0.101 (-0.42)
Total Schooling Years	-0.079 (-3.06)	-0.049 (-1.01)	0.038 (0.45)	0.059 (0.66)
Size of Government	0.319 (0.58)	-0.194 (-0.12)	0.743 (0.54)	0.664 (0.46)
Openness	-0.611 (-3.53)	-0.545 (-1.41)	0.225 (0.97)	0.209 (0.87)
M3/GDP	-0.456 (-3.05)	-0.072 (-0.17)	-0.193 (-0.61)	-0.108 (-0.32)
Observations	2622	2836	2778	2679
Countries		88	59	43
Adjusted R^2	0.112	---	0.073	0.072

NOTE: The dependent variable is *Ln(Deaths)*. The first column repeats the original findings from TS, previously reported in TABLE 3. The second column estimates the same specification using interval regression, where observations are categorized as censored whenever the number of disaster-related fatalities was 10 or less, or 500 or more. The third and four columns are fixed effects OLS regressions where observations are included only if the associated country has either (i) 5 or more (N ≥ 5), or (ii) 10 or more (N ≥ 10) disaster-events during the respective time period. All four estimating equations include *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type. The latter three estimating equations also include a linear time trend. Numbers in parentheses are t-values based on cluster-robust standard errors (robust to country-specific serial correlation and heteroskedasticity).

TABLE 6
Effect of Time Trend and Fixed Effects on Income Estimates (Fatalities).

	INTERVAL REGRESSION			FIXED EFFECTS OLS	
VARIABLES	All	$N \geq 5$	$N \geq 10$	$N \geq 5$	$N \geq 10$
Base Specification (BS)	-0.188 (-0.95)	-0.213 (-1.02)	-0.297 (-1.35)	-0.210 (-1.54)	-0.269 (-1.92)
BS + Time Trend	-0.335 (-1.94)	-0.341 (-1.88)	-0.384 (-2.02)	-0.306 (-3.07)	-0.344 (-3.32)
BS + FEs	N/A	-0.885 (-3.67)§	-0.979 (-3.94)§	-0.591 (-2.15)	-0.637 (-2.24)
BS + Time Trend + FEs	N/A	0.030 (0.11)§	-0.029 (-0.11)§	-0.053 (-0.24)	-0.079 (-0.36)
Observations	3544	3474	3354	3474	3354

NOTE: The dependent variable is *Ln(Deaths)*. The first three columns employ interval estimation where observations are categorized as censored whenever the number of disaster-related fatalities was 10 or less, or 500 or more. The last two columns use fixed effects OLS regressions where observations are included only if the associated country has either (i) 5 or more ($N \geq 5$), or (ii) 10 or more ($N \geq 10$) disaster-events during the respective time period. The "Base Specification" is represented by Equation (1) in the text. The second, third, and fourth rows respectively add a linear time trend, country fixed effects, and both a linear time trend and country fixed effects to the Base Specification. Numbers in cells are the estimates of the coefficient for *Ln(GDP per Capita)* in the respective estimating equation, along with its associated t-statistic. t-values based on cluster-robust standard errors (robust to country-specific serial correlation and heteroskedasticity).

[§] The standard error for *Ln(GDP per Capita)* could not be estimated in Stata assuming a robust (serial correlation + heteroskedasticity) error variance-covariance matrix. Accordingly, the estimating equation was re-estimated assuming only a robust form of heteroskedasticity. The reported t-statistic is the t-value from that estimating equation.

TABLE 7A
Checking for Robustness (Economic Damages) – Part II.

Dataset = ALL COUNTRIES				
Variables	TS	Interval Regression – Pooled	Fixed Effects OLS	
			$N \geq 5$	$N \geq 10$
Ln(GDP per Capita)	-0.115 (-0.81)	-2.717 (-2.29)	-3.240 (-2.43)	-3.731 (-2.40)
Total Schooling Years	-0.170 (-3.95)	-0.157 (-0.40)	0.322 (1.36)	0.411 (1.52)
Size of Government	0.772 (0.65)	-6.926 (-1.14)	-3.096 (-0.94)	-3.671 (-0.97)
Openness	-1.23 (-4.88)	-2.549 (-1.41)	-1.132 (-0.65)	-2.195 (-1.21)
M3/GDP	0.323 (1.65)	2.103 (0.95)	0.204 (0.18)	0.873 (0.71)
Observations	1655	1599	1518	1392
Countries		88	51	32
Adjusted R^2	0.301	---	0.096	0.105

NOTE: The dependent variable is *Ln(Damages/GDP)*. The first column repeats the original findings from TS. The second column estimates the same specification using interval regression, where observations are categorized as censored whenever *Ln(Damages/GDP)* was either less than or equal to -7 or greater than or equal to 0.7. The third and four columns are fixed effects OLS regressions where observations are included only if the associated country has either (i) 5 or more ($N \geq 5$), or (ii) 10 or more ($N \geq 10$) disaster-events during the respective time period. All four estimating equations include *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type. The latter three estimating equations also include a linear time trend. Numbers in parentheses are t-values based on cluster-robust standard errors (robust to country-specific serial correlation and heteroskedasticity).

TABLE 7B
Checking for Robustness (Economic Damages) – Part II.

Dataset = OECD COUNTRIES				
Variables	TS	Interval Regression – Pooled	Fixed Effects OLS	
			$N \geq 5$	$N \geq 10$
Ln(GDP per Capita)	-2.326 (-3.54)	-13.209 (-3.07)	-4.055 (-2.04)	-4.236 (-1.82)
Total Schooling Years	-0.258 (-2.30)	0.347 (1.11)[§]	-0.705 (-1.88)	-0.693 (-1.75)
Size of Government	-3.140 (-1.00)	-12.049 (-1.00)	-1.390 (-0.34)	-0.747 (-0.18)
Openness	1.178 (1.28)	-6.084 (-1.03)	1.672 (0.36)	2.576 (0.52)
M3/GDP	-0.191 (-0.47)	5.607 (3.30)	0.734 (1.18)	0.961 (1.45)
Observations	588	510	501	478
Countries		14	10	6
Adjusted R^2	0.346	---	0.081	0.086

NOTE: The dependent variable is *Ln(Damages/GDP)*. The first column repeats the original findings from TS. The second column estimates the same specification using interval regression, where observations are categorized as censored whenever *Ln(Damages/GDP)* was either less than or equal to -7 or greater than or equal to 0.7. The third and four columns are fixed effects OLS regressions where observations are included only if the associated country has either (i) 5 or more ($N \geq 5$), or (ii) 10 or more ($N \geq 10$) disaster-events during the respective time period. All four estimating equations include *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type. The latter three estimating equations also include a linear time trend. Numbers in parentheses are t-values based on cluster-robust standard errors (robust to country-specific serial correlation and heteroskedasticity).

[§] The standard error for *Total Schooling Years* could not be estimated in Stata assuming a robust (serial correlation + heteroskedasticity) error variance-covariance matrix. Accordingly, the estimating equation was re-estimated assuming only a robust form of heteroskedasticity. The t-statistic for *Total Schooling Years* that is reported in this table is the t-value from that estimating equation.

TABLE 7C
Checking for Robustness (Economic Damages) – Part II.

Dataset = DEVELOPING COUNTRIES				
Variables	TS	Interval Regression – Pooled	Fixed Effects OLS	
			N ≥ 5	N ≥ 10
Ln(GDP per Capita)	-0.227 (-1.25)	-1.526 (-1.18)	-5.068 (-3.05)	-6.646 (-3.46)
Total Schooling Years	-0.150 (-2.65)	-0.241 (-0.56)	-0.048 (-0.19)	-0.039 (-0.14)
Size of Government	0.341 (0.26)	0.045 (0.01)	-0.952 (-0.27)	-1.574 (-0.38)
Openness	-1.106 (-3.43)	0.375 (0.17)	-3.016 (-1.93)	-4.811 (-3.10)
M3/GDP	0.385 (1.28)	-3.634 (-1.83)	-0.858 (-0.87)	0.082 (0.08)
Observations	1067	1089	1017	914
Countries		74	41	26
Adjusted R^2	0.247		0.184	0.233

NOTE: The dependent variable is *Ln(Damages/GDP)*. The first column repeats the original findings from TS. The second column estimates the same specification using interval regression, where observations are categorized as censored whenever *Ln(Damages/GDP)* was either less than or equal to -7 or greater than or equal to 0.7. The third and four columns are fixed effects OLS regressions where observations are included only if the associated country has either (i) 5 or more (N ≥ 5), or (ii) 10 or more (N ≥ 10) disaster-events during the respective time period. All four estimating equations include *Ln(Population)*, *Ln(Area)*, and a series of dummy variables to indicate disaster type. The latter three estimating equations also include a linear time trend. Numbers in parentheses are t-values based on cluster-robust standard errors (robust to country-specific serial correlation and heteroskedasticity).

TABLE 8
Summary of Robustness Check Results.

Variables	***Dependent Variable:***	
	Fatalities	***Economic Damages***
Ln(GDP per Capita)	We consistently estimate a negative and statistically significant impact of income on disaster-related fatalities. Our estimates are several times larger in absolute value than the original TS study.	We consistently estimate a negative impact of income on disaster-related economic damages. The estimated impacts are substantially larger in size than TS, and often statistically significant, even when they were not significant in the original TS study.
Total Schooling Years	Our estimated coefficient estimates are always statistically insignificant. Coefficient estimates vary in sign across equations.	Our estimated coefficient estimates are always statistically insignificant. Coefficient estimates vary in sign across equations.
Size of Government	With one exception, we estimate a positive impact of *Size of Government* on fatalities. However all of the estimates are insignificant.	With one exception, we estimate a negative impact of *Size of Government* on economic damages (generally opposite of TS). However, all of the estimates are insignificant
Openness	Our estimated coefficient estimates are always statistically insignificant. Coefficient estimates vary in sign across equations.	Like TS, we obtain different sign estimates for this variable, depending on the sample. However, all of our estimates are statistically insignificant.
M3/GDP	Like TS, we obtain different sign estimates for this variable, depending on the sample. However, all of our estimates are statistically insignificant.	Like TS, we obtain different sign estimates for this variable, depending on the sample. However, all of our estimates are statistically insignificant.

NOTE: This table summarizes the empirical results from TABLES 5A-5C, 6, and 7A-7C.

APPENDIX 1
Comparison of Sample Characteristics for Data Used in Columns (1) and (2) of TABLE 4A.

Column (1) Sample

VARIABLE = Ln(Deaths)

```
-------------------------------------------------------------
      Percentiles      Smallest
 1%            0              0
 5%            0              0
10%      1.09861              0       Obs                3053
25%      2.19722              0       Sum of Wgt.        3053

50%       3.2581                      Mean           3.310178
                        Largest       Std. Dev.      1.790837
75%      4.36945       10.30895
90%      5.54126       10.59663       Variance       3.207096
95%      6.35784       11.10937       Skewness        .448733
99%      8.45297       11.84126       Kurtosis       3.684408
```

VARIABLE = Ln(GDP per Capita)

```
-------------------------------------------------------------
      Percentiles      Smallest
 1%      6.62711        5.79993
 5%      6.91238        6.05038
10%      7.09492        6.05038       Obs                3053
25%      7.61014        6.13931       Sum of Wgt.        3053

50%      8.22589                      Mean           8.358773
                        Largest       Std. Dev.      .9939237
75%      8.91961       10.41356
90%      9.97658       10.41356       Variance       .9878843
95%     10.18194       10.41356       Skewness       .3650889
99%     10.41356       10.41356       Kurtosis       2.362819
```

Column (2) Sample

VARIABLE = Ln(Deaths)

```
-------------------------------------------------------------
      Percentiles      Smallest
 1%            0              0
 5%            0              0
10%      1.09861              0       Obs                3053
25%      2.19722              0       Sum of Wgt.        3053

50%       3.2581                      Mean           3.310178
                        Largest       Std. Dev.      1.790837
75%      4.36945       10.30895
90%      5.54126       10.59663       Variance       3.207096
95%      6.35784       11.10937       Skewness        .448733
99%      8.45297       11.84126       Kurtosis       3.684408
```

VARIABLE = Ln(GDP per Capita)

```
-------------------------------------------------------------
      Percentiles      Smallest
 1%      6.51052        5.79993
 5%      6.91975        6.05038
10%      7.09492        6.05038       Obs                3053
25%      7.60654        6.13931       Sum of Wgt.        3053

50%      8.22871                      Mean           8.359033
                        Largest       Std. Dev.      .9949594
75%      8.91961       10.41356
90%      9.97658       10.41356       Variance       .9899442
95%     10.18362       10.41356       Skewness       .3583871
99%     10.39582       10.41356       Kurtosis       2.355537
```

Column (1) Sample	***Column (2) Sample***

Column (1) Sample

VARIABLE = Total Schooling Years

```
-------------------------------------------------------------
      Percentiles      Smallest
 1%          .91          .1496
 5%       2.0002          .1772
10%       2.4508          .1876       Obs                3053
25%         3.83           .198       Sum of Wgt.        3053

50%        5.289                      Mean           5.808954
                        Largest       Std. Dev.      2.814613
75%       7.4034         12.049
90%      10.4364         12.049       Variance       7.922045
95%       11.772         12.049       Skewness       .6123218
99%       12.049         12.049       Kurtosis       2.716353
```

VARIABLE = Size of Government

```
-------------------------------------------------------------
      Percentiles      Smallest
 1%      .057705        .053713
 5%      .069293        .053713
10%      .096061        .053713       Obs                3053
25%       .13565        .053713       Sum of Wgt.        3053

50%       .17078                      Mean           .1836001
                        Largest       Std. Dev.      .0717243
75%       .23963          .5067
90%       .27641         .50783       Variance       .0051444
95%        .3012         .51695       Skewness       .5135195
99%       .35329         .51695       Kurtosis       3.393919
```

Column (2) Sample

VARIABLE = Total Schooling Years

```
-------------------------------------------------------------
      Percentiles      Smallest
 1%          .94          .1496
 5%       2.0002          .1772
10%       2.4522          .1876       Obs                3053
25%       3.8914           .198       Sum of Wgt.        3053

50%       5.4864                      Mean           5.907884
                        Largest       Std. Dev.      2.854682
75%       7.5218         12.829
90%        10.56         12.829       Variance       8.149207
95%       11.772         12.829       Skewness       .5821597
99%       12.747         12.829       Kurtosis       2.691398
```

VARIABLE = Size of Government

```
-------------------------------------------------------------
      Percentiles      Smallest
 1%        .0567          .0451
 5%        .0695          .0451
10%         .096          .0451       Obs                3053
25%         .131          .0451       Sum of Wgt.        3053

50%        .1655                      Mean           .1795361
                        Largest       Std. Dev.      .0705106
75%        .2349          .5067
90%        .2736          .5078       Variance       .0049718
95%        .2966           .517       Skewness       .5845332
99%        .3533           .517       Kurtosis       3.487057
```

Column (1) Sample	***Column (2) Sample***

Column (1) Sample

VARIABLE = Openness

	Percentiles	Smallest		
1%	.081119	.048087		
5%	.11446	.052076		
10%	.14243	.05309	Obs	3053
25%	.20712	.060131	Sum of Wgt.	3053
50%	.33684		Mean	.4102056
		Largest	Std. Dev.	.2889859
75%	.53494	2.50224		
90%	.77414	2.65137	Variance	.0835129
95%	.91619	2.90569	Skewness	2.451141
99%	1.31162	3.04849	Kurtosis	15.16423

Column (2) Sample

VARIABLE = Openness

	Percentiles	Smallest		
1%	.0811	.0481		
5%	.1145	.0521		
10%	.1424	.0531	Obs	3053
25%	.2085	.0601	Sum of Wgt.	3053
50%	.3451		Mean	.4105598
		Largest	Std. Dev.	.2901526
75%	.5308	2.5022		
90%	.7664	2.6514	Variance	.0841885
95%	.9509	2.9057	Skewness	2.480014
99%	1.3196	3.0485	Kurtosis	15.10885

Column (1) Sample

VARIABLE = M3/GDP

	Percentiles	Smallest		
1%	.1062	.056989		
5%	.16761	.056989		
10%	.20411	.060338	Obs	3053
25%	.28412	.060338	Sum of Wgt.	3053
50%	.42059		Mean	.5165938
		Largest	Std. Dev.	.3594713
75%	.6297	1.99466		
90%	.94009	1.99563	Variance	.1292196
95%	1.38727	1.99563	Skewness	1.932154
99%	1.85073	2.23726	Kurtosis	6.998821

Column (2) Sample

VARIABLE = M3/GDP

	Percentiles	Smallest		
1%	.1062	.057		
5%	.1647	.057		
10%	.202	.0603	Obs	3053
25%	.2837	.0603	Sum of Wgt.	3053
50%	.4146		Mean	.5136354
		Largest	Std. Dev.	.3587416
75%	.6208	1.9613		
90%	.9342	1.9956	Variance	.1286955
95%	1.4044	1.9956	Skewness	1.927674
99%	1.8507	2.2373	Kurtosis	6.902559

NOTE: This table compares the original TS variable values with their updated values (cf. Columns 1 and 2 in TABLE 4A and the associated discussion in the text). This allows one to determine which variables are responsible for the different estimates in these two columns. As Footnote 1 above reports, virtually all of the differences can be explained by updated values of the variables *Total Schooling Years* and *Size of Government.*

APPENDIX 2
Effect of Time Trend and Fixed Effects on Economic Damages Estimates.

	INTERVAL REGRESSION			FIXED EFFECTS OLS	
VARIABLES	All	$N \geq 5$	$N \geq 10$	$N \geq 5$	$N \geq 10$
Base Specification (BS)	-3.015 (-2.32)	-3.066 (-2.14)	-1.822 (-1.11)	-2.325 (-3.22)	-2.129 (-2.52)
BS + Time Trend	-2.717 (-2.29)	-2.961 (-2.30)	-2.054 (-1.38)	-2.297 (-3.24)	-2.244 (-2.75)
BS + FEs	N/A	-3.169 (-4.09)[§]	-3.465 (-4.17)[§]	-2.994 (-2.32)	-3.408 (-2.41)
BS + Time Trend + FEs	N/A	-3.782 (-4.65)[§]	-4.107 (-4.69)[§]	-3.240 (-2.39)	-3.731 (-2.37)
Observations	1599	1518	1392	1518	1392

NOTE: The dependent variable is *Ln(Damages/GDP)*. The first three columns employ interval estimation where observations are categorized as censored whenever *Ln(Damages/GDP)* was either less than or equal to -7 or greater than or equal to 0.7. The last two columns use fixed effects OLS regressions where observations are included only if the associated country has either (i) 5 or more ($N \geq 5$), or (ii) 10 or more ($N \geq 10$) disaster-events during the respective time period. The "Base Specification" is represented by Equation (1) in the text. The second, third, and fourth rows respectively add a linear time trend, country fixed effects, and both a linear time trend and country fixed effects to the Base Specification. Numbers in cells are the estimates of the coefficient for *Ln(GDP per Capita)* in the respective estimating equation, along with its associated t-statistic. t-values based on cluster-robust standard errors (robust to country-specific serial correlation and heteroskedasticity).

[§] The standard error for *Ln(GDP per Capita)* could not be estimated in Stata assuming a robust (serial correlation + heteroskedasticity) error variance-covariance matrix. Accordingly, the estimating equation was re-estimated assuming only a robust form of heteroskedasticity. The reported t-statistic is the t-value from that estimating equation.