

## MEMORANDUM

**FROM:** Patrick Cavanaugh and Eric Elizes  
**TO:** Mx. Gourinchas, Chief Economist of the IMF  
**SUBJECT:** Results of Economic Freedom analysis  
**DATE:** January 28, 2023

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### SUMMARY

Summarize basic findings. The regression model that is most appropriate for  
These results are summarized in the following table:

### What contributes to the rank of a country?

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	Simple Regression	Multivariate Regression	Fixed Effects Estimator	Multivariate
	(1)	(2)	(3)	
gov_size	-1.966*** (0.398)	-4.595*** (0.414)	-3.762*** (0.390)	-3.722*** (0.008)
property_rights	-13.951*** (0.488)	-4.861*** (0.464)	-4.689*** (0.009)	-4.866*** (0.000)
sound_money	-5.802*** (0.488)	-4.068*** (0.464)	-4.039*** (0.009)	-3.410*** (0.000)
trade	-2.290*** (0.011)	2.835*** (0.011)	9.202*** (0.011)	1.226*** (0.011)
regulation	-0.041 (0.011)	2.921*** (0.011)	10.906*** (0.011)	0.273 (0.011)
log(gov_size)	-0.479*** (0.044)			
log(property_rights)	-0.331*** (0.039)			
log(sound_money)	-0.266*** (0.029)			
log(trade)	0.180*** (0.032)			
log(regulation)	0.111* (0.063)			
trade:regulation	-1.205*** (0.193)			
Constant	80.585*** (3.174)	232.395*** (5.218)	104.422*** (8.601)	61.475*** (5.377)
				97.497*** (5.146)
				104.304*** (0.105)
				5.327*** (0.135)
				5.467*** (0.135)

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Observations 2,994 2,891 2,891 2,891 2,893 2,908 2,891 2,873  
R2 0.005 0.654 0.860 0.862 0.850 0.855 0.895 0.891

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Note:  $p < 0.1$ ;  $p < 0.05$ ;  $p < 0.01$

## SIMPLE REGRESSION

When looking at what impacts the rank of countries, a variable of interest would be government size. As the size of the government increases, it is predicted that the rank would fall, indicating a lower economic freedom score. This is because as the size of government increases, by way of state ownership of assets and top marginal tax rate, economic freedom is limited. The simple regression that was run is as follows:

$$\hat{rank} = b_0 + b_1 * government\ size$$

The results of this regression are included below:

```
##
## Call:
## lm(formula = rank ~ gov_size, data = econ_free_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -68.415 -35.060  -1.702   33.509   90.975
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  80.5847     3.4075   23.65 < 2e-16 ***
## gov_size     -1.9658     0.5313   -3.70 0.000219 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 41.23 on 2992 degrees of freedom
## (732 observations deleted due to missingness)
## Multiple R-squared:  0.004555,    Adjusted R-squared:  0.004222
## F-statistic: 13.69 on 1 and 2992 DF,  p-value: 0.0002194
```

From the results of the regression, a 1 unit increase in government size is associated with a 1.97 decrease in rank on average. The results of the simple regression agree with the prediction that as government size increases, rank decreases. This result was found to be statistically significant at the 0.001 significance level. This result is also economically significant as the size of government can greatly affect the rank of countries.

## MULTIVARIATE REGRESSION

The multivariate regression that was run is as follows:

$$\hat{rank} = b_0 + b_1 * government\ size + b_2 * property\ rights + b_3 * sound\ money + b_4 * trade + b_5 * regulation$$

The results of this regression are included below:

```
##
## Call:
## lm(formula = rank ~ gov_size + property_rights + sound_money +
##     trade + regulation, data = econ_free_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -96.90 -13.81   0.15  15.97  61.43
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    232.3951     3.1736  73.227 < 2e-16 ***
## gov_size        -4.5949     0.3584 -12.821 < 2e-16 ***
## property_rights -13.9506     0.3713 -37.573 < 2e-16 ***
## sound_money     -5.8022     0.3619 -16.033 < 2e-16 ***
## trade           -2.2898     0.4626  -4.950 7.86e-07 ***
## regulation      -0.0410     0.5392  -0.076  0.939
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 24.49 on 2885 degrees of freedom
## (835 observations deleted due to missingness)
## Multiple R-squared:  0.6539, Adjusted R-squared:  0.6533
## F-statistic: 1090 on 5 and 2885 DF, p-value: < 2.2e-16
```

From the results of the regression, a 1 unit increase in government size is associated with a 4.59 decrease in rank on average, holding property rights, sound money, trade, and regulation constant. The results of the multivariate regression also agree with the prediction that as government size increases, rank decreases. This result was found to be statistically significant at the 0.001 significance level. Compared to the simple regression, this regression shows that government size has an even larger affect on rank. This result is even more economically significant as the size of government can greatly affect the rank of countries. The constant in this regression represents the rank value that would be predicted if all the independent variables were simultaneously equal to zero. This is not economically significant because it is not possible.

## FIXED EFFECTS ESTIMATOR

Being located in different countries The fixed effects estimator regression that was run is as follows:

$$\hat{rank} = b_0 + b_1 * government\ size + b_2 * property\ rights + b_3 * sound\ money + b_4 * trade + b_5 * regulation + b_6 * country$$

The results of this regression are as follows:

```
summary(fixed_eff_est)
```

```
##
## Call:
## lm(formula = rank ~ gov_size + property_rights + sound_money +
##     trade + regulation + country, data = econ_free_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -94.904  -7.823   0.586   8.796  55.741
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    104.4215     5.2183  20.011 < 2e-16 ***
## gov_size        -3.7618     0.4009  -9.383 < 2e-16 ***
## property_rights  -4.8614     0.4712 -10.317 < 2e-16 ***
## sound_money     -4.0681     0.3008 -13.523 < 2e-16 ***
## trade           2.8350     0.3873   7.320 3.26e-13 ***
## regulation      2.9211     0.5438   5.372 8.45e-08 ***
## countryAlgeria   62.4396     5.4465  11.464 < 2e-16 ***
## countryAngola    63.5687     6.1412  10.351 < 2e-16 ***
## countryArgentina 39.0372     5.1576   7.569 5.12e-14 ***
## countryArmenia  -26.1530     5.8496  -4.471 8.11e-06 ***
## countryAustralia -39.9353     5.3215  -7.504 8.30e-14 ***
## countryAustria  -33.2695     5.5456  -5.999 2.24e-09 ***
## countryAzerbaijan 43.1439     5.9963   7.195 8.03e-13 ***
## countryBahamas   -9.2300     5.4143  -1.705 0.088359 .
## countryBahrain  -25.3479     5.3124  -4.771 1.93e-06 ***
## countryBangladesh 38.6594     5.2890   7.309 3.51e-13 ***
## countryBarbados  23.5477     5.3531   4.399 1.13e-05 ***
## countryBelarus   53.6002    16.5127   3.246 0.001185 **
## countryBelgium  -31.5739     5.4328  -5.812 6.90e-09 ***
```

## countryBelize	4.1595	5.5580	0.748	0.454291	
## countryBenin	38.4930	5.3845	7.149	1.12e-12	***
## countryBhutan	19.0593	8.9422	2.131	0.033146	*
## countryBolivia	25.9599	5.2322	4.962	7.42e-07	***
## countryBosnia and Herzegovina	21.2240	6.1040	3.477	0.000515	***
## countryBotswana	-8.0499	5.4097	-1.488	0.136851	
## countryBrazil	36.7030	5.1299	7.155	1.07e-12	***
## countryBrunei Darussalam	7.8635	7.3434	1.071	0.284341	
## countryBulgaria	-3.1256	5.3648	-0.583	0.560196	
## countryBurkina Faso	48.7606	6.1533	7.924	3.31e-15	***
## countryBurundi	51.2110	5.3258	9.616	< 2e-16	***
## countryCambodia	11.6871	7.1506	1.634	0.102286	
## countryCameroon	40.5338	5.2309	7.749	1.30e-14	***
## countryCanada	-45.8403	5.3734	-8.531	< 2e-16	***
## countryCape Verde	38.6153	7.2376	5.335	1.03e-07	***
## countryCentral Afr. Rep.	58.0488	5.4130	10.724	< 2e-16	***
## countryChad	58.1983	5.3961	10.785	< 2e-16	***
## countryChile	-35.4731	5.1527	-6.884	7.18e-12	***
## countryChina	40.8885	5.3836	7.595	4.20e-14	***
## countryColombia	17.8156	5.2103	3.419	0.000637	***
## countryCongo, Dem. R.	49.8110	5.3848	9.250	< 2e-16	***
## countryCongo, Rep. Of	44.9878	5.4179	8.304	< 2e-16	***
## countryCosta Rica	-20.3413	5.1804	-3.927	8.83e-05	***
## countryCote d'Ivoire	43.5603	5.3108	8.202	3.59e-16	***
## countryCroatia	14.1075	5.5288	2.552	0.010776	*
## countryCyprus	-16.8628	5.2756	-3.196	0.001408	**
## countryCzech Rep.	-12.1148	5.5553	-2.181	0.029287	*
## countryDenmark	-44.6566	5.6657	-7.882	4.62e-15	***
## countryDominican Rep.	4.8148	5.1909	0.928	0.353729	
## countryEcuador	35.1428	5.2226	6.729	2.07e-11	***
## countryEgypt	44.7805	5.2265	8.568	< 2e-16	***
## countryEl Salvador	-13.3801	5.2343	-2.556	0.010635	*
## countryEstonia	-41.0582	5.5527	-7.394	1.88e-13	***
## countryEthiopia	68.1604	6.0729	11.224	< 2e-16	***
## countryFiji	4.5292	5.5834	0.811	0.417330	
## countryFinland	-38.6605	5.4980	-7.032	2.57e-12	***
## countryFrance	-23.0305	5.3851	-4.277	1.96e-05	***
## countryGabon	39.3541	5.3018	7.423	1.53e-13	***
## countryGambia, The	1.0366	7.1641	0.145	0.884964	
## countryGeorgia	-36.5129	5.8024	-6.293	3.62e-10	***
## countryGermany	-31.8219	5.3868	-5.907	3.91e-09	***

## countryGhana	23.2693	5.2153	4.462	8.46e-06	***
## countryGreece	2.2247	5.1724	0.430	0.667149	
## countryGuatemala	-14.9951	5.1934	-2.887	0.003916	**
## countryGuinea	72.6696	8.9387	8.130	6.46e-16	***
## countryGuinea-Bissau	51.5793	5.6673	9.101	< 2e-16	***
## countryGuyana	29.2250	5.6571	5.166	2.56e-07	***
## countryHaiti	18.1206	5.5198	3.283	0.001041	**
## countryHonduras	-5.2229	5.2508	-0.995	0.319982	
## countryHong Kong	-46.5810	5.2660	-8.846	< 2e-16	***
## countryHungary	-8.8522	5.4187	-1.634	0.102452	
## countryIceland	-13.6822	5.4442	-2.513	0.012022	*
## countryIndia	28.4995	5.1437	5.541	3.30e-08	***
## countryIndonesia	15.1959	5.0887	2.986	0.002850	**
## countryIran	56.7549	5.3568	10.595	< 2e-16	***
## countryIraq	76.5676	16.5358	4.630	3.82e-06	***
## countryIreland	-45.4945	5.3387	-8.522	< 2e-16	***
## countryIsrael	-10.0087	5.2038	-1.923	0.054542	.
## countryItaly	-15.7848	5.2191	-3.024	0.002514	**
## countryJamaica	-12.1250	5.1870	-2.338	0.019482	*
## countryJapan	-33.0576	5.2875	-6.252	4.69e-10	***
## countryJordan	-20.2697	5.2439	-3.865	0.000114	***
## countryKazakhstan	12.0540	6.0504	1.992	0.046442	*
## countryKenya	-0.8690	5.0960	-0.171	0.864605	
## countryKorea, South	-17.4506	5.1545	-3.385	0.000721	***
## countryKuwait	-5.0558	5.3373	-0.947	0.343587	
## countryKyrgyz Republic	21.5146	5.9945	3.589	0.000338	***
## countryLaos	26.4594	10.0181	2.641	0.008309	**
## countryLatvia	-29.0484	5.4646	-5.316	1.15e-07	***
## countryLebanon	19.3585	7.1783	2.697	0.007044	**
## countryLesotho	46.0599	6.1395	7.502	8.45e-14	***
## countryLiberia	31.3288	10.0084	3.130	0.001765	**
## countryLibya	79.4398	8.9712	8.855	< 2e-16	***
## countryLithuania	-24.4291	5.4457	-4.486	7.56e-06	***
## countryLuxembourg	-37.3743	5.5288	-6.760	1.68e-11	***
## countryMacedonia	3.2046	5.8639	0.547	0.584766	
## countryMadagascar	39.4108	5.2990	7.437	1.37e-13	***
## countryMalawi	39.1624	5.2635	7.440	1.34e-13	***
## countryMalaysia	-7.9147	5.2216	-1.516	0.129695	
## countryMali	37.8178	5.2288	7.233	6.13e-13	***
## countryMalta	-23.2832	5.3897	-4.320	1.62e-05	***
## countryMauritania	54.6566	6.0788	8.991	< 2e-16	***

## countryMauritius	-32.7599	5.2649	-6.222	5.65e-10	***
## countryMexico	9.3202	5.1238	1.819	0.069021	.
## countryMoldova	24.6828	6.0212	4.099	4.27e-05	***
## countryMongolia	4.1844	5.8689	0.713	0.475917	
## countryMontenegro	0.7056	6.0783	0.116	0.907591	
## countryMorocco	34.4989	5.1940	6.642	3.72e-11	***
## countryMozambique	60.7547	5.8023	10.471	< 2e-16	***
## countryMyanmar	72.9944	5.5953	13.046	< 2e-16	***
## countryNamibia	15.3454	5.4894	2.795	0.005218	**
## countryNepal	39.4165	5.4846	7.187	8.53e-13	***
## countryNetherlands	-38.3871	5.5273	-6.945	4.72e-12	***
## countryNew Zealand	-46.0972	5.4324	-8.486	< 2e-16	***
## countryNicaragua	-6.0134	5.2607	-1.143	0.253102	
## countryNiger	51.6139	5.2655	9.802	< 2e-16	***
## countryNigeria	34.0860	5.2405	6.504	9.25e-11	***
## countryNorway	-27.8146	5.4883	-5.068	4.29e-07	***
## countryOman	-16.7735	5.4927	-3.054	0.002281	**
## countryPakistan	35.8045	5.1396	6.966	4.06e-12	***
## countryPanama	-27.5690	5.1952	-5.307	1.21e-07	***
## countryPap. New Guinea	12.7051	5.3745	2.364	0.018150	*
## countryParaguay	15.9034	5.3279	2.985	0.002861	**
## countryPeru	-21.0748	5.1833	-4.066	4.92e-05	***
## countryPhilippines	-3.9412	5.1266	-0.769	0.442096	
## countryPoland	4.5329	5.3406	0.849	0.396092	
## countryPortugal	-16.5322	5.2518	-3.148	0.001662	**
## countryQatar	-25.1054	7.2786	-3.449	0.000571	***
## countryRomania	-7.1840	5.3253	-1.349	0.177434	
## countryRussia	36.3225	5.3780	6.754	1.75e-11	***
## countryRwanda	6.8582	5.5364	1.239	0.215549	
## countrySaudi Arabia	36.0613	7.2868	4.949	7.92e-07	***
## countrySenegal	41.2838	5.2264	7.899	4.04e-15	***
## countrySerbia	26.6891	6.0365	4.421	1.02e-05	***
## countrySeychelles	-7.6413	8.9005	-0.859	0.390674	
## countrySierra Leone	51.0547	5.2827	9.665	< 2e-16	***
## countrySingapore	-45.0495	5.2845	-8.525	< 2e-16	***
## countrySlovak Rep	-19.6924	5.4783	-3.595	0.000331	***
## countrySlovenia	7.8350	5.5584	1.410	0.158779	
## countrySouth Africa	-2.8488	5.1201	-0.556	0.577994	
## countrySpain	-26.1591	5.1671	-5.063	4.41e-07	***
## countrySri Lanka	22.0268	5.2028	4.234	2.38e-05	***
## countrySudan	95.5936	16.5724	5.768	8.91e-09	***

```

## countrySuriname          33.3203      7.1831      4.639 3.67e-06 ***
## countrySwaziland         35.3138      7.2573      4.866 1.20e-06 ***
## countrySweden            -31.5237      5.6016     -5.628 2.01e-08 ***
## countrySwitzerland       -39.1185      5.3304     -7.339 2.83e-13 ***
## countrySyria              58.0827      5.2640     11.034 < 2e-16 ***
## countryTaiwan            -24.6809      5.1408     -4.801 1.66e-06 ***
## countryTajikistan        42.8981      7.1639      5.988 2.40e-09 ***
## countryTanzania          30.8717      5.2140      5.921 3.60e-09 ***
## countryThailand           8.2698      5.0916      1.624 0.104446
## countryTimor-Leste       24.9317      7.6505      3.259 0.001132 **
## countryTogo              46.9211      5.3099      8.837 < 2e-16 ***
## countryTrinidad & Tob.    1.5835      5.2460      0.302 0.762787
## countryTunisia           20.2997      5.1364      3.952 7.94e-05 ***
## countryTurkey            17.2433      5.1645      3.339 0.000853 ***
## countryUganda            -6.3813      5.2716     -1.210 0.226193
## countryUkraine           48.6945      5.5570      8.763 < 2e-16 ***
## countryUnit. Arab Em.    -34.9874      5.3020     -6.599 4.96e-11 ***
## countryUnited Kingdom    -47.3871      5.3911     -8.790 < 2e-16 ***
## countryUnited States     -44.4039      5.3003     -8.378 < 2e-16 ***
## countryUruguay          -10.9848      5.2065     -2.110 0.034966 *
## countryVenezuela         36.4686      5.1965      7.018 2.83e-12 ***
## countryVietnam           44.3031      5.7768      7.669 2.39e-14 ***
## countryYemen, Rep.       54.3134      7.1900      7.554 5.72e-14 ***
## countryZambia            8.9695      5.1993      1.725 0.084615 .
## countryZimbabwe          50.5967      5.3133      9.523 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 16.03 on 2724 degrees of freedom
## (835 observations deleted due to missingness)
## Multiple R-squared:  0.86, Adjusted R-squared:  0.8515
## F-statistic: 100.8 on 166 and 2724 DF, p-value: < 2.2e-16

```

## MULTIVARIATE REGRESSION WITH INTERACTION TERM

The multivariate regression with an interaction term that was run is as follows:

$$\hat{rank} = b_0 + b_1 * government\ size + b_2 * property\ rights + b_3 * sound\ money + b_4 * trade + b_5 * regulation + b_6 * country$$

The results of this regression are as follows:



```
summary(int_term)
```

```
##
## Call:
## lm(formula = rank ~ gov_size + property_rights + sound_money +
##      trade + regulation + country + trade * regulation, data = econ_free_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -97.619  -7.912   0.613   8.542  53.779
##
## Coefficients:
##                                Estimate Std. Error t value Pr(>|t|)
## (Intercept)                   61.4750     8.6006   7.148 1.13e-12 ***
## gov_size                      -3.7223     0.3982  -9.348 < 2e-16 ***
## property_rights                -4.6887     0.4688 -10.002 < 2e-16 ***
## sound_money                   -4.0391     0.2988 -13.519 < 2e-16 ***
## trade                         9.2022     1.0879   8.458 < 2e-16 ***
## regulation                    10.9058     1.3857   7.870 5.07e-15 ***
## countryAlgeria                 64.0110     5.4146  11.822 < 2e-16 ***
## countryAngola                  63.3764     6.0987  10.392 < 2e-16 ***
## countryArgentina                39.4017     5.1222   7.692 2.00e-14 ***
## countryArmenia                 -24.3269     5.8164  -4.182 2.97e-05 ***
## countryAustralia               -37.6356     5.2974  -7.104 1.54e-12 ***
## countryAustria                 -30.6234     5.5234  -5.544 3.23e-08 ***
## countryAzerbaijan              42.5629     5.9555   7.147 1.14e-12 ***
## countryBahamas                 -12.5162     5.4024  -2.317 0.020590 *
## countryBahrain                 -22.0999     5.3011  -4.169 3.16e-05 ***
## countryBangladesh              37.5672     5.2552   7.149 1.12e-12 ***
## countryBarbados                22.2747     5.3199   4.187 2.92e-05 ***
## countryBelarus                 53.7168    16.3983   3.276 0.001067 **
## countryBelgium                 -27.8358     5.4282  -5.128 3.13e-07 ***
## countryBelize                   3.0008     5.5226   0.543 0.586922
## countryBenin                   37.0573     5.3522   6.924 5.46e-12 ***
## countryBhutan                  17.6766     8.8829   1.990 0.046697 *
## countryBolivia                 26.1118     5.1960   5.025 5.35e-07 ***
## countryBosnia and Herzegovina  22.8516     6.0672   3.766 0.000169 ***
## countryBotswana                -7.0957     5.3744  -1.320 0.186849
## countryBrazil                  36.4380     5.0945   7.152 1.09e-12 ***
## countryBrunei Darussalam       10.0699     7.3010   1.379 0.167930
## countryBulgaria                -1.0386     5.3380  -0.195 0.845748
```

## countryBurkina Faso	47.3941	6.1146	7.751	1.28e-14	***
## countryBurundi	49.6185	5.2950	9.371	< 2e-16	***
## countryCambodia	12.2829	7.1017	1.730	0.083820	.
## countryCameroon	39.0756	5.1999	7.515	7.69e-14	***
## countryCanada	-40.9351	5.3934	-7.590	4.37e-14	***
## countryCape Verde	38.3693	7.1876	5.338	1.02e-07	***
## countryCentral Afr. Rep.	57.8603	5.3756	10.763	< 2e-16	***
## countryChad	58.4512	5.3588	10.907	< 2e-16	***
## countryChile	-32.7087	5.1360	-6.368	2.23e-10	***
## countryChina	41.4942	5.3472	7.760	1.19e-14	***
## countryColombia	17.8701	5.1742	3.454	0.000561	***
## countryCongo, Dem. R.	50.6274	5.3491	9.465	< 2e-16	***
## countryCongo, Rep. Of	44.2679	5.3816	8.226	2.97e-16	***
## countryCosta Rica	-19.6013	5.1458	-3.809	0.000143	***
## countryCote d'Ivoire	42.5213	5.2766	8.058	1.14e-15	***
## countryCroatia	15.2832	5.4937	2.782	0.005440	**
## countryCyprus	-15.7158	5.2422	-2.998	0.002743	**
## countryCzech Rep.	-9.4977	5.5327	-1.717	0.086156	.
## countryDenmark	-39.3927	5.6890	-6.924	5.44e-12	***
## countryDominican Rep.	4.7388	5.1550	0.919	0.358032	
## countryEcuador	35.3547	5.1865	6.817	1.14e-11	***
## countryEgypt	44.6761	5.1903	8.608	< 2e-16	***
## countryEl Salvador	-11.9592	5.2030	-2.299	0.021607	*
## countryEstonia	-36.1171	5.5705	-6.484	1.06e-10	***
## countryEthiopia	66.0946	6.0398	10.943	< 2e-16	***
## countryFiji	2.7237	5.5522	0.491	0.623769	
## countryFinland	-35.6528	5.4810	-6.505	9.22e-11	***
## countryFrance	-20.5030	5.3630	-3.823	0.000135	***
## countryGabon	37.7711	5.2712	7.166	9.93e-13	***
## countryGambia, The	2.3674	7.1176	0.333	0.739455	
## countryGeorgia	-31.3551	5.8209	-5.387	7.79e-08	***
## countryGermany	-30.6754	5.3526	-5.731	1.11e-08	***
## countryGhana	23.2488	5.1792	4.489	7.46e-06	***
## countryGreece	2.7260	5.1372	0.531	0.595715	
## countryGuatemala	-13.9350	5.1602	-2.700	0.006967	**
## countryGuinea	69.7510	8.8890	7.847	6.08e-15	***
## countryGuinea-Bissau	51.0850	5.6286	9.076	< 2e-16	***
## countryGuyana	29.9303	5.6190	5.327	1.08e-07	***
## countryHaiti	18.4917	5.4819	3.373	0.000753	***
## countryHonduras	-4.4116	5.2160	-0.846	0.397751	
## countryHong Kong	-35.4857	5.5220	-6.426	1.54e-10	***

## countryHungary	-6.0545	5.3997	-1.121	0.262280	
## countryIceland	-13.1084	5.4073	-2.424	0.015406	*
## countryIndia	26.9625	5.1140	5.272	1.45e-07	***
## countryIndonesia	15.6611	5.0540	3.099	0.001963	**
## countryIran	58.9576	5.3313	11.059	< 2e-16	***
## countryIraq	74.4454	16.4247	4.533	6.08e-06	***
## countryIreland	-40.5401	5.3605	-7.563	5.36e-14	***
## countryIsrael	-7.9427	5.1783	-1.534	0.125185	
## countryItaly	-14.3948	5.1877	-2.775	0.005562	**
## countryJamaica	-11.2962	5.1528	-2.192	0.028447	*
## countryJapan	-31.1614	5.2596	-5.925	3.52e-09	***
## countryJordan	-18.3066	5.2170	-3.509	0.000457	***
## countryKazakhstan	9.0740	6.0273	1.505	0.132316	
## countryKenya	-1.7552	5.0626	-0.347	0.728848	
## countryKorea, South	-16.8874	5.1196	-3.299	0.000984	***
## countryKuwait	-3.3394	5.3074	-0.629	0.529273	
## countryKyrgyz Republic	21.2530	5.9531	3.570	0.000363	***
## countryLaos	25.9008	9.9491	2.603	0.009282	**
## countryLatvia	-26.0055	5.4485	-4.773	1.91e-06	***
## countryLebanon	19.1228	7.1287	2.683	0.007351	**
## countryLesotho	44.5774	6.1016	7.306	3.60e-13	***
## countryLiberia	29.3076	9.9443	2.947	0.003234	**
## countryLibya	79.2715	8.9091	8.898	< 2e-16	***
## countryLithuania	-22.2147	5.4195	-4.099	4.27e-05	***
## countryLuxembourg	-32.4074	5.5475	-5.842	5.78e-09	***
## countryMacedonia	5.4487	5.8343	0.934	0.350433	
## countryMadagascar	39.7038	5.2625	7.545	6.14e-14	***
## countryMalawi	38.0071	5.2303	7.267	4.79e-13	***
## countryMalaysia	-6.5662	5.1899	-1.265	0.205914	
## countryMali	37.5418	5.1928	7.230	6.26e-13	***
## countryMalta	-21.4342	5.3605	-3.999	6.54e-05	***
## countryMauritania	53.5758	6.0392	8.871	< 2e-16	***
## countryMauritius	-30.4276	5.2417	-5.805	7.18e-09	***
## countryMexico	10.0325	5.0896	1.971	0.048803	*
## countryMoldova	24.9603	5.9797	4.174	3.08e-05	***
## countryMongolia	3.9661	5.8283	0.680	0.496248	
## countryMontenegro	3.3815	6.0513	0.559	0.576343	
## countryMorocco	34.1151	5.1584	6.613	4.50e-11	***
## countryMozambique	60.4304	5.7623	10.487	< 2e-16	***
## countryMyanmar	77.6727	5.6066	13.854	< 2e-16	***
## countryNamibia	13.6438	5.4581	2.500	0.012487	*

## countryNepal	38.5716	5.4483	7.080	1.83e-12	***
## countryNetherlands	-34.0871	5.5319	-6.162	8.25e-10	***
## countryNew Zealand	-39.5882	5.4941	-7.206	7.45e-13	***
## countryNicaragua	-3.1612	5.2441	-0.603	0.546677	
## countryNiger	51.1348	5.2296	9.778	< 2e-16	***
## countryNigeria	33.3542	5.2055	6.408	1.74e-10	***
## countryNorway	-26.6010	5.4537	-4.878	1.14e-06	***
## countryOman	-12.3585	5.5000	-2.247	0.024721	*
## countryPakistan	35.0013	5.1056	6.855	8.76e-12	***
## countryPanama	-24.7818	5.1784	-4.786	1.80e-06	***
## countryPap. New Guinea	11.0972	5.3434	2.077	0.037913	*
## countryParaguay	15.9244	5.2909	3.010	0.002639	**
## countryPeru	-17.0635	5.1872	-3.290	0.001016	**
## countryPhilippines	-4.1377	5.0912	-0.813	0.416458	
## countryPoland	6.4021	5.3120	1.205	0.228224	
## countryPortugal	-15.3624	5.2187	-2.944	0.003270	**
## countryQatar	-21.7483	7.2480	-3.001	0.002719	**
## countryRomania	-4.6927	5.3033	-0.885	0.376310	
## countryRussia	35.2211	5.3437	6.591	5.22e-11	***
## countryRwanda	6.0426	5.4996	1.099	0.271984	
## countrySaudi Arabia	35.3262	7.2373	4.881	1.12e-06	***
## countrySenegal	41.4538	5.1903	7.987	2.02e-15	***
## countrySerbia	27.4555	5.9959	4.579	4.88e-06	***
## countrySeychelles	-4.9629	8.8491	-0.561	0.574954	
## countrySierra Leone	51.5265	5.2466	9.821	< 2e-16	***
## countrySingapore	-36.8997	5.4071	-6.824	1.09e-11	***
## countrySlovak Rep	-16.6098	5.4626	-3.041	0.002383	**
## countrySlovenia	9.1627	5.5239	1.659	0.097285	.
## countrySouth Africa	-2.6857	5.0847	-0.528	0.597405	
## countrySpain	-24.4071	5.1389	-4.749	2.15e-06	***
## countrySri Lanka	20.9435	5.1696	4.051	5.24e-05	***
## countrySudan	92.3310	16.4659	5.607	2.26e-08	***
## countrySuriname	33.2568	7.1333	4.662	3.28e-06	***
## countrySwaziland	35.1181	7.2071	4.873	1.16e-06	***
## countrySweden	-28.3913	5.5853	-5.083	3.96e-07	***
## countrySwitzerland	-36.1740	5.3143	-6.807	1.22e-11	***
## countrySyria	60.2081	5.2386	11.493	< 2e-16	***
## countryTaiwan	-23.8353	5.1069	-4.667	3.20e-06	***
## countryTajikistan	41.5708	7.1174	5.841	5.81e-09	***
## countryTanzania	31.1328	5.1780	6.012	2.07e-09	***
## countryThailand	7.7023	5.0571	1.523	0.127859	

```

## countryTimor-Leste          25.9477      7.5992      3.415 0.000648 ***
## countryTogo                 46.5841      5.2734      8.834 < 2e-16 ***
## countryTrinidad & Tob.       2.6042      5.2122      0.500 0.617376
## countryTunisia              19.9015      5.1012      3.901 9.80e-05 ***
## countryTurkey               17.4890      5.1288      3.410 0.000659 ***
## countryUganda               -4.9831      5.2399     -0.951 0.341691
## countryUkraine              48.0915      5.5194      8.713 < 2e-16 ***
## countryUnit. Arab Em.      -31.1024      5.3018     -5.866 4.99e-09 ***
## countryUnited Kingdom      -41.3343      5.4405     -7.598 4.12e-14 ***
## countryUnited States       -39.4566      5.3227     -7.413 1.64e-13 ***
## countryUruguay             -9.6954      5.1746     -1.874 0.061083 .
## countryVenezuela           38.8785      5.1749      7.513 7.80e-14 ***
## countryVietnam              42.9948      5.7406      7.490 9.28e-14 ***
## countryYemen, Rep.         54.0792      7.1403      7.574 4.93e-14 ***
## countryZambia               9.5600      5.1641      1.851 0.064242 .
## countryZimbabwe            52.0504      5.2816      9.855 < 2e-16 ***
## trade:regulation            -1.2053      0.1926     -6.257 4.55e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 15.92 on 2723 degrees of freedom
## (835 observations deleted due to missingness)
## Multiple R-squared:  0.862, Adjusted R-squared:  0.8536
## F-statistic: 101.9 on 167 and 2723 DF, p-value: < 2.2e-16

```

## MULTICOLLINEARITY ANALYSIS

During the correlation analysis, it was noted that trade and sound money had the highest correlation between the explanatory variables with a correlation of 0.68. To further investigate the multicollinearity, the two following regressions were run:

$$\hat{rank} = b_0 + b_1 * government\ size + b_2 * property\ rights + b_3 * trade + b_4 * regulation + b_5 * country$$

$$\hat{rank} = b_0 + b_1 * government\ size + b_2 * property\ rights + b_3 * sound\ money + b_4 * regulation + b_5 * country$$

The results of this regression are as follows:

```

##
## Call:

```

```
## lm(formula = rank ~ gov_size + property_rights + trade + regulation +
##      country, data = econ_free_clean)
##
## Residuals:
##      Min        1Q    Median        3Q        Max
## -95.222  -7.853   0.244   9.010  59.781
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    97.49675     5.37687   18.133 < 2e-16 ***
## gov_size       -3.86617     0.41450   -9.327 < 2e-16 ***
## property_rights -4.86596     0.48765   -9.978 < 2e-16 ***
## trade          1.22579     0.38243    3.205 0.001365 **
## regulation      0.27315     0.52441    0.521 0.602498
## countryAlgeria   62.28512     5.63716   11.049 < 2e-16 ***
## countryAngola    72.73446     6.31894   11.511 < 2e-16 ***
## countryArgentina 45.62097     5.31490    8.584 < 2e-16 ***
## countryArmenia  -24.39373     6.05316   -4.030 5.73e-05 ***
## countryAustralia -37.14045     5.50396   -6.748 1.82e-11 ***
## countryAustria  -32.08532     5.73930   -5.590 2.49e-08 ***
## countryAzerbaijan 51.03815     6.17783    8.261 < 2e-16 ***
## countryBahamas    0.92699     5.54801    0.167 0.867315
## countryBahrain  -20.32713     5.48559   -3.706 0.000215 ***
## countryBangladesh 44.12293     5.45815    8.084 9.33e-16 ***
## countryBarbados   32.41278     5.49958    5.894 4.24e-09 ***
## countryBelarus    67.99537    17.05630    3.987 6.88e-05 ***
## countryBelgium   -29.75983     5.62160   -5.294 1.29e-07 ***
## countryBelize     13.27622     5.71007    2.325 0.020142 *
## countryBenin      45.54017     5.54762    8.209 3.40e-16 ***
## countryBhutan     29.14118     9.22286    3.160 0.001597 **
## countryBolivia    26.30154     5.41544    4.857 1.26e-06 ***
## countryBosnia and Herzegovina 26.32777     6.30644    4.175 3.08e-05 ***
## countryBotswana   -3.30411     5.58793   -0.591 0.554372
## countryBrazil     41.71824     5.29625    7.877 4.80e-15 ***
## countryBrunei Darussalam 14.75754     7.58307    1.946 0.051743 .
## countryBulgaria    2.41037     5.53719    0.435 0.663375
## countryBurkina Faso 57.44961     6.33508    9.068 < 2e-16 ***
## countryBurundi    53.61259     5.50951    9.731 < 2e-16 ***
## countryCambodia   10.75253     7.40087    1.453 0.146374
## countryCameroon   45.61285     5.40054    8.446 < 2e-16 ***
## countryCanada    -40.87424     5.54892   -7.366 2.31e-13 ***
```

## countryCape Verde	42.49145	7.48572	5.676	1.52e-08	***
## countryCentral Afr. Rep.	60.49034	5.59983	10.802	< 2e-16	***
## countryChad	62.73207	5.57472	11.253	< 2e-16	***
## countryChile	-30.06859	5.31755	-5.655	1.72e-08	***
## countryChina	40.47740	5.57196	7.264	4.86e-13	***
## countryColombia	23.28092	5.37710	4.330	1.55e-05	***
## countryCongo, Dem. R.	57.96064	5.53941	10.463	< 2e-16	***
## countryCongo, Rep. Of	54.58123	5.56118	9.815	< 2e-16	***
## countryCosta Rica	-17.18474	5.35662	-3.208	0.001351	**
## countryCote d'Ivoire	49.40925	5.47914	9.018	< 2e-16	***
## countryCroatia	17.96402	5.71545	3.143	0.001690	**
## countryCyprus	-14.19990	5.45682	-2.602	0.009312	**
## countryCzech Rep.	-9.24280	5.74616	-1.609	0.107838	
## countryDenmark	-39.79341	5.85312	-6.799	1.29e-11	***
## countryDominican Rep.	12.54474	5.34038	2.349	0.018893	*
## countryEcuador	43.58476	5.36762	8.120	6.99e-16	***
## countryEgypt	39.30713	5.39288	7.289	4.08e-13	***
## countryEl Salvador	-12.65406	5.41748	-2.336	0.019575	*
## countryEstonia	-34.90262	5.72856	-6.093	1.27e-09	***
## countryEthiopia	79.39907	6.22668	12.751	< 2e-16	***
## countryFiji	18.15196	5.68361	3.194	0.001420	**
## countryFinland	-35.96085	5.68717	-6.323	2.98e-10	***
## countryFrance	-20.90751	5.57165	-3.752	0.000179	***
## countryGabon	50.14931	5.42600	9.242	< 2e-16	***
## countryGambia, The	4.21032	7.41131	0.568	0.570018	
## countryGeorgia	-30.64878	5.98945	-5.117	3.32e-07	***
## countryGermany	-32.25628	5.57525	-5.786	8.05e-09	***
## countryGhana	31.24779	5.36370	5.826	6.35e-09	***
## countryGreece	0.91448	5.35238	0.171	0.864351	
## countryGuatemala	-14.50103	5.37537	-2.698	0.007025	**
## countryGuinea	75.27707	9.24995	8.138	6.04e-16	***
## countryGuinea-Bissau	59.65304	5.83473	10.224	< 2e-16	***
## countryGuyana	34.73544	5.84105	5.947	3.08e-09	***
## countryHaiti	23.03189	5.70117	4.040	5.50e-05	***
## countryHonduras	-4.57973	5.43467	-0.843	0.399477	
## countryHong Kong	-37.69396	5.40737	-6.971	3.94e-12	***
## countryHungary	-6.58187	5.60619	-1.174	0.240483	
## countryIceland	-4.47853	5.59077	-0.801	0.423169	
## countryIndia	33.49134	5.31018	6.307	3.31e-10	***
## countryIndonesia	16.28409	5.26643	3.092	0.002008	**
## countryIran	57.25587	5.40933	10.585	< 2e-16	***

## countryIraq	80.10303	17.11337	4.681	3.00e-06	***
## countryIreland	-39.76025	5.50891	-7.217	6.84e-13	***
## countryIsrael	-6.79834	5.38100	-1.263	0.206555	
## countryItaly	-14.49962	5.40119	-2.685	0.007307	**
## countryJamaica	-5.99992	5.34838	-1.122	0.262038	
## countryJapan	-30.78905	5.47024	-5.628	2.00e-08	***
## countryJordan	-16.88437	5.42180	-3.114	0.001864	**
## countryKazakhstan	16.05326	6.25456	2.567	0.010322	*
## countryKenya	2.41867	5.26868	0.459	0.646223	
## countryKorea, South	-16.33128	5.33458	-3.061	0.002225	**
## countryKuwait	1.01705	5.50540	0.185	0.853449	
## countryKyrgyz Republic	24.11673	6.20148	3.889	0.000103	***
## countryLaos	32.54478	10.35860	3.142	0.001697	**
## countryLatvia	-24.04602	5.64357	-4.261	2.11e-05	***
## countryLebanon	15.44059	7.42388	2.080	0.037632	*
## countryLesotho	50.60623	6.34562	7.975	2.22e-15	***
## countryLiberia	28.66137	10.35731	2.767	0.005691	**
## countryLibya	84.43192	9.27816	9.100	< 2e-16	***
## countryLithuania	-19.51605	5.62439	-3.470	0.000529	***
## countryLuxembourg	-33.95163	5.71692	-5.939	3.24e-09	***
## countryMacedonia	10.72609	6.04285	1.775	0.076009	.
## countryMadagascar	42.38486	5.48017	7.734	1.45e-14	***
## countryMalawi	51.03570	5.37229	9.500	< 2e-16	***
## countryMalaysia	2.67510	5.34439	0.501	0.616732	
## countryMali	44.13033	5.39110	8.186	4.11e-16	***
## countryMalta	-19.52776	5.57155	-3.505	0.000464	***
## countryMauritania	60.79149	6.27491	9.688	< 2e-16	***
## countryMauritius	-29.91309	5.44509	-5.494	4.30e-08	***
## countryMexico	14.91392	5.28638	2.821	0.004819	**
## countryMoldova	31.85821	6.20841	5.131	3.08e-07	***
## countryMongolia	9.15609	6.06256	1.510	0.131091	
## countryMontenegro	7.98945	6.26729	1.275	0.202493	
## countryMorocco	38.57414	5.36734	7.187	8.52e-13	***
## countryMozambique	64.61873	5.99880	10.772	< 2e-16	***
## countryMyanmar	75.33678	5.78855	13.015	< 2e-16	***
## countryNamibia	27.65780	5.60312	4.936	8.45e-07	***
## countryNepal	47.75317	5.64118	8.465	< 2e-16	***
## countryNetherlands	-36.28435	5.71897	-6.345	2.60e-10	***
## countryNew Zealand	-38.94535	5.59644	-6.959	4.28e-12	***
## countryNicaragua	0.02065	5.42587	0.004	0.996964	
## countryNiger	54.22091	5.44662	9.955	< 2e-16	***



## countryNigeria	42.76471	5.38377	7.943	2.85e-15	***
## countryNorway	-24.81988	5.67632	-4.373	1.27e-05	***
## countryOman	-8.66508	5.65237	-1.533	0.125392	
## countryPakistan	42.03259	5.29835	7.933	3.09e-15	***
## countryPanama	-25.77786	5.37563	-4.795	1.71e-06	***
## countryPap. New Guinea	23.55130	5.50084	4.281	1.92e-05	***
## countryParaguay	15.67250	5.51452	2.842	0.004516	**
## countryPeru	-15.96330	5.35108	-2.983	0.002878	**
## countryPhilippines	-1.20194	5.30221	-0.227	0.820685	
## countryPoland	6.58742	5.52573	1.192	0.233312	
## countryPortugal	-16.19050	5.43564	-2.979	0.002921	**
## countryQatar	-16.63396	7.50603	-2.216	0.026768	*
## countryRomania	-0.69260	5.48988	-0.126	0.899615	
## countryRussia	42.37209	5.54741	7.638	3.03e-14	***
## countryRwanda	12.34674	5.71526	2.160	0.030835	*
## countrySaudi Arabia	41.07885	7.53280	5.453	5.39e-08	***
## countrySenegal	45.14363	5.40195	8.357	< 2e-16	***
## countrySerbia	33.84367	6.22465	5.437	5.90e-08	***
## countrySeychelles	-3.95877	9.20831	-0.430	0.667293	
## countrySierra Leone	56.83634	5.45016	10.428	< 2e-16	***
## countrySingapore	-37.38679	5.43812	-6.875	7.66e-12	***
## countrySlovak Rep	-16.24147	5.66449	-2.867	0.004172	**
## countrySlovenia	9.57378	5.75177	1.664	0.096129	.
## countrySouth Africa	3.92130	5.27472	0.743	0.457296	
## countrySpain	-24.14079	5.34613	-4.516	6.58e-06	***
## countrySri Lanka	30.81246	5.34300	5.767	8.98e-09	***
## countrySudan	101.38198	17.14707	5.912	3.79e-09	***
## countrySuriname	35.16932	7.43358	4.731	2.35e-06	***
## countrySwaziland	42.04201	7.49450	5.610	2.23e-08	***
## countrySweden	-28.95173	5.79486	-4.996	6.22e-07	***
## countrySwitzerland	-36.44482	5.51332	-6.610	4.60e-11	***
## countrySyria	58.21350	5.44848	10.684	< 2e-16	***
## countryTaiwan	-26.49974	5.31898	-4.982	6.68e-07	***
## countryTajikistan	42.48079	7.41489	5.729	1.12e-08	***
## countryTanzania	34.05678	5.39135	6.317	3.11e-10	***
## countryThailand	14.83136	5.24611	2.827	0.004731	**
## countryTimor-Leste	27.91116	7.91553	3.526	0.000429	***
## countryTogo	50.66954	5.48873	9.232	< 2e-16	***
## countryTrinidad & Tob.	6.63797	5.41656	1.225	0.220494	
## countryTunisia	26.32888	5.29683	4.971	7.08e-07	***
## countryTurkey	26.30778	5.30097	4.963	7.38e-07	***

```

## countryUganda          -0.07176    5.43516  -0.013 0.989468
## countryUkraine         62.50300    5.65514  11.052 < 2e-16 ***
## countryUnit. Arab Em.  -27.71261    5.46024  -5.075 4.13e-07 ***
## countryUnited Kingdom  -41.19281    5.56047  -7.408 1.70e-13 ***
## countryUnited States   -40.13724    5.47647  -7.329 3.04e-13 ***
## countryUruguay         -4.76279    5.36848  -0.887 0.375062
## countryVenezuela       43.10902    5.35548   8.050 1.23e-15 ***
## countryVietnam         54.12606    5.93181   9.125 < 2e-16 ***
## countryYemen, Rep.     54.73365    7.44193   7.355 2.52e-13 ***
## countryZambia          14.52415    5.36503   2.707 0.006828 **
## countryZimbabwe        62.63785    5.42200  11.553 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 16.59 on 2727 degrees of freedom
## (833 observations deleted due to missingness)
## Multiple R-squared:  0.8503, Adjusted R-squared:  0.8412
## F-statistic: 93.88 on 165 and 2727 DF,  p-value: < 2.2e-16

##
## Call:
## lm(formula = rank ~ gov_size + property_rights + sound_money +
##      regulation + country, data = econ_free_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -88.449  -7.695   0.475   8.953  56.814
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    104.3038     5.1461  20.268 < 2e-16 ***
## gov_size        -2.9223     0.3899  -7.495 8.92e-14 ***
## property_rights  -4.2060     0.4644  -9.057 < 2e-16 ***
## sound_money     -3.4104     0.2899 -11.763 < 2e-16 ***
## regulation       3.7990     0.5320   7.141 1.18e-12 ***
## countryAlgeria   62.0310     5.4482  11.386 < 2e-16 ***
## countryAngola    65.6009     6.1588  10.652 < 2e-16 ***
## countryArgentina 34.6584     5.1146   6.776 1.50e-11 ***
## countryArmenia   -27.0049     5.8888  -4.586 4.73e-06 ***
## countryAustralia -41.8456     5.3314  -7.849 5.97e-15 ***
## countryAustria   -31.9737     5.5384  -5.773 8.66e-09 ***
## countryAzerbaijan 43.5048     6.0247   7.221 6.65e-13 ***

```

## countryBahamas	-15.7944	5.4044	-2.923	0.003501	**
## countryBahrain	-24.4508	5.3265	-4.590	4.62e-06	***
## countryBangladesh	34.5409	5.3045	6.512	8.81e-11	***
## countryBarbados	22.5584	5.3686	4.202	2.73e-05	***
## countryBelarus	55.6566	16.7704	3.319	0.000916	***
## countryBelgium	-27.5468	5.3868	-5.114	3.38e-07	***
## countryBelize	0.8644	5.5879	0.155	0.877075	
## countryBenin	35.4313	5.2891	6.699	2.54e-11	***
## countryBhutan	15.6024	9.0541	1.723	0.084957	.
## countryBolivia	28.0600	5.2172	5.378	8.15e-08	***
## countryBosnia and Herzegovina	23.1863	6.1285	3.783	0.000158	***
## countryBotswana	-8.3835	5.4231	-1.546	0.122248	
## countryBrazil	37.5622	5.1187	7.338	2.84e-13	***
## countryBrunei Darussalam	8.4304	7.4126	1.137	0.255507	
## countryBulgaria	-2.3035	5.3755	-0.429	0.668306	
## countryBurkina Faso	48.4362	6.1965	7.817	7.67e-15	***
## countryBurundi	47.1257	5.3277	8.845	< 2e-16	***
## countryCambodia	11.2904	7.2212	1.564	0.118048	
## countryCameroon	38.3336	5.2494	7.302	3.68e-13	***
## countryCanada	-46.3508	5.3848	-8.608	< 2e-16	***
## countryCape Verde	38.7976	7.3006	5.314	1.16e-07	***
## countryCentral Afr. Rep.	55.7221	5.4284	10.265	< 2e-16	***
## countryChad	54.8928	5.3431	10.274	< 2e-16	***
## countryChile	-34.4002	5.1537	-6.675	2.98e-11	***
## countryChina	41.3847	5.3774	7.696	1.94e-14	***
## countryColombia	17.3660	5.2270	3.322	0.000904	***
## countryCongo, Dem. R.	50.0647	5.3948	9.280	< 2e-16	***
## countryCongo, Rep. Of	45.7490	5.4250	8.433	< 2e-16	***
## countryCosta Rica	-20.1176	5.1881	-3.878	0.000108	***
## countryCote d'Ivoire	42.4339	5.3308	7.960	2.49e-15	***
## countryCroatia	16.1081	5.5259	2.915	0.003586	**
## countryCyprus	-17.0357	5.2851	-3.223	0.001282	**
## countryCzech Rep.	-9.6975	5.5481	-1.748	0.080592	.
## countryDenmark	-42.1421	5.6482	-7.461	1.14e-13	***
## countryDominican Rep.	4.4660	5.2093	0.857	0.391345	
## countryEcuador	36.5486	5.2212	7.000	3.20e-12	***
## countryEgypt	42.4555	5.2283	8.120	6.95e-16	***
## countryEl Salvador	-13.9595	5.2553	-2.656	0.007947	**
## countryEstonia	-39.0027	5.5520	-7.025	2.69e-12	***
## countryEthiopia	65.5447	6.1119	10.724	< 2e-16	***
## countryFiji	1.1067	5.6130	0.197	0.843703	

## countryFinland	-37.4327	5.4888	-6.820	1.12e-11	***
## countryFrance	-20.4409	5.3611	-3.813	0.000140	***
## countryGabon	38.4133	5.3218	7.218	6.79e-13	***
## countryGambia, The	0.9948	7.2338	0.138	0.890624	
## countryGeorgia	-34.9967	5.8256	-6.007	2.13e-09	***
## countryGermany	-29.0100	5.3537	-5.419	6.53e-08	***
## countryGhana	21.4560	5.2310	4.102	4.22e-05	***
## countryGreece	4.6162	5.1438	0.897	0.369575	
## countryGuatemala	-14.4387	5.2037	-2.775	0.005563	**
## countryGuinea	68.6957	9.0474	7.593	4.26e-14	***
## countryGuinea-Bissau	50.8178	5.5242	9.199	< 2e-16	***
## countryGuyana	30.7854	5.5781	5.519	3.73e-08	***
## countryHaiti	16.9980	5.4725	3.106	0.001915	**
## countryHonduras	-6.6531	5.2108	-1.277	0.201782	
## countryHong Kong	-46.1230	5.2812	-8.733	< 2e-16	***
## countryHungary	-7.6406	5.4172	-1.410	0.158527	
## countryIceland	-15.8132	5.4544	-2.899	0.003771	**
## countryIndia	22.1521	5.0976	4.346	1.44e-05	***
## countryIndonesia	15.1343	5.0929	2.972	0.002988	**
## countryIran	52.0971	5.3453	9.746	< 2e-16	***
## countryIraq	74.8563	16.8009	4.455	8.71e-06	***
## countryIreland	-43.5852	5.3274	-8.181	4.25e-16	***
## countryIsrael	-7.1018	5.1709	-1.373	0.169730	
## countryItaly	-12.6072	5.1839	-2.432	0.015079	*
## countryJamaica	-13.2802	5.2105	-2.549	0.010866	*
## countryJapan	-34.0259	5.2962	-6.425	1.55e-10	***
## countryJordan	-19.9932	5.2591	-3.802	0.000147	***
## countryKazakhstan	6.3248	6.0736	1.041	0.297801	
## countryKenya	-3.3198	5.1121	-0.649	0.516140	
## countryKorea, South	-18.0337	5.1610	-3.494	0.000483	***
## countryKuwait	-3.9298	5.2894	-0.743	0.457570	
## countryKyrgyz Republic	20.0509	6.0396	3.320	0.000912	***
## countryLaos	24.6113	10.1554	2.423	0.015437	*
## countryLatvia	-27.3824	5.4675	-5.008	5.84e-07	***
## countryLebanon	17.8162	7.2503	2.457	0.014060	*
## countryLesotho	45.0176	6.1804	7.284	4.22e-13	***
## countryLiberia	26.7209	10.1393	2.635	0.008451	**
## countryLibya	78.9659	9.0775	8.699	< 2e-16	***
## countryLithuania	-23.1503	5.4522	-4.246	2.25e-05	***
## countryLuxembourg	-34.5142	5.5036	-6.271	4.15e-10	***
## countryMacedonia	4.0258	5.8946	0.683	0.494692	

## countryMadagascar	38.6159	5.3165	7.263	4.89e-13	***
## countryMalawi	38.3031	5.2787	7.256	5.16e-13	***
## countryMalaysia	-7.4986	5.2333	-1.433	0.152009	
## countryMali	38.0749	5.2385	7.268	4.73e-13	***
## countryMalta	-22.3134	5.3902	-4.140	3.58e-05	***
## countryMauritania	54.3865	6.1195	8.887	< 2e-16	***
## countryMauritius	-34.0662	5.2858	-6.445	1.36e-10	***
## countryMexico	9.1684	5.1343	1.786	0.074255	.
## countryMoldova	24.6916	6.0607	4.074	4.75e-05	***
## countryMongolia	1.7996	5.9105	0.304	0.760794	
## countryMontenegro	2.6844	6.1013	0.440	0.659987	
## countryMorocco	33.8522	5.2013	6.508	9.00e-11	***
## countryMozambique	62.2932	5.8141	10.714	< 2e-16	***
## countryMyanmar	66.2790	5.5637	11.913	< 2e-16	***
## countryNamibia	13.1517	5.5126	2.386	0.017111	*
## countryNepal	38.8001	5.5124	7.039	2.44e-12	***
## countryNetherlands	-35.1653	5.4940	-6.401	1.81e-10	***
## countryNew Zealand	-45.5285	5.4367	-8.374	< 2e-16	***
## countryNicaragua	-5.0795	5.2715	-0.964	0.335345	
## countryNiger	49.3264	5.2766	9.348	< 2e-16	***
## countryNigeria	31.5583	5.2595	6.000	2.23e-09	***
## countryNorway	-27.1388	5.4819	-4.951	7.85e-07	***
## countryOman	-14.7503	5.4940	-2.685	0.007301	**
## countryPakistan	32.6514	5.1526	6.337	2.73e-10	***
## countryPanama	-25.1122	5.1818	-4.846	1.33e-06	***
## countryPap. New Guinea	10.7039	5.4037	1.981	0.047709	*
## countryParaguay	17.0104	5.3323	3.190	0.001439	**
## countryPeru	-19.9134	5.1881	-3.838	0.000127	***
## countryPhilippines	-6.0609	5.1476	-1.177	0.239127	
## countryPoland	5.2075	5.3426	0.975	0.329795	
## countryPortugal	-13.8999	5.2208	-2.662	0.007804	**
## countryQatar	-25.5191	7.3531	-3.470	0.000528	***
## countryRomania	-6.3423	5.2564	-1.207	0.227691	
## countryRussia	34.8341	5.3977	6.454	1.29e-10	***
## countryRwanda	4.9926	5.4849	0.910	0.362768	
## countrySaudi Arabia	34.8317	7.3589	4.733	2.32e-06	***
## countrySenegal	41.6869	5.2313	7.969	2.33e-15	***
## countrySerbia	28.1311	6.0642	4.639	3.67e-06	***
## countrySeychelles	-6.4752	9.0055	-0.719	0.472185	
## countrySierra Leone	49.7459	5.2970	9.391	< 2e-16	***
## countrySingapore	-43.8639	5.2861	-8.298	< 2e-16	***

```

## countrySlovak Rep      -17.6024      5.4759   -3.214  0.001322 **
## countrySlovenia        10.4623      5.5446    1.887  0.059274 .
## countrySouth Africa    -2.9777      5.1314   -0.580  0.561769
## countrySpain           -24.4906      5.1548   -4.751  2.13e-06 ***
## countrySri Lanka       20.3571      5.2230    3.898  9.95e-05 ***
## countrySudan           85.1306     16.7996    5.067  4.30e-07 ***
## countrySuriname        33.1843      7.2513    4.576  4.94e-06 ***
## countrySwaziland       34.7415      7.3332    4.738  2.27e-06 ***
## countrySweden          -28.4678      5.5714   -5.110  3.45e-07 ***
## countrySwitzerland     -41.0161      5.3445   -7.674  2.29e-14 ***
## countrySyria           55.1507      5.2637   10.478  < 2e-16 ***
## countryTaiwan          -24.6465      5.1392   -4.796  1.71e-06 ***
## countryTajikistan      40.2301      7.2314    5.563  2.90e-08 ***
## countryTanzania        27.9583      5.2189    5.357  9.16e-08 ***
## countryThailand         6.6661      5.1042    1.306  0.191662
## countryTimor-Leste     28.9340      7.3255    3.950  8.02e-05 ***
## countryTogo            44.9184      5.2622    8.536  < 2e-16 ***
## countryTrinidad & Tob.   1.7702      5.2587    0.337  0.736422
## countryTunisia         18.7237      5.1462    3.638  0.000279 ***
## countryTurkey          18.4751      5.1601    3.580  0.000349 ***
## countryUganda          -7.7348      5.2980   -1.460  0.144423
## countryUkraine         50.1686      5.5668    9.012  < 2e-16 ***
## countryUnit. Arab Em.  -31.7002      5.2310   -6.060  1.55e-09 ***
## countryUnited Kingdom  -45.8550      5.3859   -8.514  < 2e-16 ***
## countryUnited States   -45.3926      5.3150   -8.541  < 2e-16 ***
## countryUruguay         -8.4305      5.1887   -1.625  0.104325
## countryVenezuela       36.9166      5.1923    7.110  1.48e-12 ***
## countryVietnam         42.6126      5.8111    7.333  2.95e-13 ***
## countryYemen, Rep.     55.2453      7.2508    7.619  3.49e-14 ***
## countryZambia          8.7041      5.2081    1.671  0.094782 .
## countryZimbabwe        48.1067      5.3235    9.037  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 16.31 on 2742 degrees of freedom
## (818 observations deleted due to missingness)
## Multiple R-squared:  0.8547, Adjusted R-squared:  0.8459
## F-statistic: 97.73 on 165 and 2742 DF,  p-value: < 2.2e-16

```

-3.7618 -3.86617 -2.9223

## LOG-LINEAR MODEL

The log-linear regression that was run is as follows:

$$\log(\hat{rank}) = b_0 + b_1 * government\ size + b_2 * property\ rights + b_3 * sound\ money + b_4 * trade + b_5 * regulation + b_6 * c$$

The results of this regression are as follows:

```
##
## Call:
## lm(formula = log(rank) ~ gov_size + property_rights + sound_money +
##     trade + regulation + country, data = econ_free_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.3142 -0.1396  0.0313  0.1747  1.4428
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      5.327336    0.104912  50.779 < 2e-16 ***
## gov_size        -0.090698    0.008060 -11.253 < 2e-16 ***
## property_rights  -0.099066    0.009473 -10.457 < 2e-16 ***
## sound_money     -0.067474    0.006048 -11.156 < 2e-16 ***
## trade           0.029789    0.007787   3.826 0.000133 ***
## regulation      0.031509    0.010932   2.882 0.003980 **
## countryAlgeria   0.478148    0.109500   4.367 1.31e-05 ***
## countryAngola    0.432120    0.123466   3.500 0.000473 ***
## countryArgentina 0.324939    0.103691   3.134 0.001744 **
## countryArmenia  -0.678666    0.117604  -5.771 8.78e-09 ***
## countryAustralia -1.665625    0.106988 -15.568 < 2e-16 ***
## countryAustria  -1.006867    0.111492  -9.031 < 2e-16 ***
## countryAzerbaijan 0.451498    0.120553   3.745 0.000184 ***
## countryBahamas  -0.147042    0.108853  -1.351 0.176861
## countryBahrain  -0.485923    0.106803  -4.550 5.61e-06 ***
## countryBangladesh 0.427578    0.106333   4.021 5.95e-05 ***
## countryBarbados  0.264668    0.107622   2.459 0.013985 *
## countryBelarus   0.590655    0.331982   1.779 0.075322 .
## countryBelgium  -0.840960    0.109225  -7.699 1.90e-14 ***
## countryBelize    0.083836    0.111742   0.750 0.453156
## countryBenin     0.359160    0.108254   3.318 0.000919 ***
## countryBhutan    0.368849    0.179779   2.052 0.040296 *
```

## countryBolivia	0.246829	0.105192	2.346	0.019023	*
## countryBosnia and Herzegovina	0.242305	0.122718	1.974	0.048427	*
## countryBotswana	-0.140754	0.108760	-1.294	0.195715	
## countryBrazil	0.373668	0.103134	3.623	0.000296	***
## countryBrunei Darussalam	0.101514	0.147636	0.688	0.491764	
## countryBulgaria	-0.084362	0.107857	-0.782	0.434187	
## countryBurkina Faso	0.426030	0.123710	3.444	0.000582	***
## countryBurundi	0.399374	0.107073	3.730	0.000195	***
## countryCambodia	0.230559	0.143760	1.604	0.108879	
## countryCameroon	0.371161	0.105166	3.529	0.000424	***
## countryCanada	-1.978406	0.108029	-18.314	< 2e-16	***
## countryCape Verde	0.478911	0.145510	3.291	0.001010	**
## countryCentral Afr. Rep.	0.460402	0.108827	4.231	2.41e-05	***
## countryChad	0.500428	0.108486	4.613	4.16e-06	***
## countryChile	-1.077807	0.103593	-10.404	< 2e-16	***
## countryChina	0.450234	0.108235	4.160	3.28e-05	***
## countryColombia	0.208608	0.104751	1.991	0.046531	*
## countryCongo, Dem. R.	0.330801	0.108259	3.056	0.002268	**
## countryCongo, Rep. Of	0.206076	0.108926	1.892	0.058610	.
## countryCosta Rica	-0.446937	0.104149	-4.291	1.84e-05	***
## countryCote d'Ivoire	0.384006	0.106772	3.597	0.000328	***
## countryCroatia	0.164331	0.111154	1.478	0.139414	
## countryCyprus	-0.485424	0.106064	-4.577	4.93e-06	***
## countryCzech Rep.	-0.220256	0.111688	-1.972	0.048703	*
## countryDenmark	-1.384442	0.113907	-12.154	< 2e-16	***
## countryDominican Rep.	0.076855	0.104362	0.736	0.461530	
## countryEcuador	0.333786	0.104998	3.179	0.001495	**
## countryEgypt	0.481012	0.105077	4.578	4.91e-06	***
## countryEl Salvador	-0.357459	0.105233	-3.397	0.000692	***
## countryEstonia	-1.254273	0.111635	-11.235	< 2e-16	***
## countryEthiopia	0.650967	0.122093	5.332	1.05e-07	***
## countryFiji	0.093841	0.112252	0.836	0.403235	
## countryFinland	-1.280850	0.110535	-11.588	< 2e-16	***
## countryFrance	-0.506338	0.108265	-4.677	3.06e-06	***
## countryGabon	0.309634	0.106591	2.905	0.003704	**
## countryGambia, The	0.057555	0.144031	0.400	0.689481	
## countryGeorgia	-1.015975	0.116656	-8.709	< 2e-16	***
## countryGermany	-1.026136	0.108299	-9.475	< 2e-16	***
## countryGhana	0.284988	0.104852	2.718	0.006609	**
## countryGreece	-0.063154	0.103990	-0.607	0.543695	
## countryGuatemala	-0.305809	0.104412	-2.929	0.003430	**



## countryGuinea	0.659855	0.179710	3.672	0.000245	***
## countryGuinea-Bissau	0.311836	0.113938	2.737	0.006243	**
## countryGuyana	0.250372	0.113734	2.201	0.027793	*
## countryHaiti	0.201185	0.110974	1.813	0.069958	.
## countryHonduras	-0.061768	0.105566	-0.585	0.558520	
## countryHong Kong	-3.612131	0.105872	-34.118	< 2e-16	***
## countryHungary	-0.174794	0.108942	-1.604	0.108726	
## countryIceland	-0.566836	0.109454	-5.179	2.40e-07	***
## countryIndia	0.363803	0.103412	3.518	0.000442	***
## countryIndonesia	0.168206	0.102306	1.644	0.100261	
## countryIran	0.593476	0.107697	5.511	3.91e-08	***
## countryIraq	0.577038	0.332445	1.736	0.082724	.
## countryIreland	-1.664502	0.107332	-15.508	< 2e-16	***
## countryIsrael	-0.229216	0.104621	-2.191	0.028542	*
## countryItaly	-0.340210	0.104929	-3.242	0.001200	**
## countryJamaica	-0.230379	0.104283	-2.209	0.027246	*
## countryJapan	-1.072477	0.106304	-10.089	< 2e-16	***
## countryJordan	-0.384409	0.105426	-3.646	0.000271	***
## countryKazakhstan	0.255290	0.121641	2.099	0.035933	*
## countryKenya	-0.023466	0.102452	-0.229	0.818850	
## countryKorea, South	-0.392161	0.103630	-3.784	0.000158	***
## countryKuwait	-0.127785	0.107304	-1.191	0.233808	
## countryKyrgyz Republic	0.331727	0.120517	2.753	0.005953	**
## countryLaos	0.469680	0.201410	2.332	0.019775	*
## countryLatvia	-0.724526	0.109863	-6.595	5.10e-11	***
## countryLebanon	0.347922	0.144317	2.411	0.015983	*
## countryLesotho	0.445517	0.123433	3.609	0.000312	***
## countryLiberia	0.482797	0.201216	2.399	0.016489	*
## countryLibya	0.544239	0.180362	3.017	0.002572	**
## countryLithuania	-0.626129	0.109484	-5.719	1.19e-08	***
## countryLuxembourg	-1.376896	0.111153	-12.387	< 2e-16	***
## countryMacedonia	0.047531	0.117892	0.403	0.686851	
## countryMadagascar	0.427717	0.106534	4.015	6.11e-05	***
## countryMalawi	0.383469	0.105822	3.624	0.000296	***
## countryMalaysia	-0.255988	0.104978	-2.438	0.014813	*
## countryMali	0.331979	0.105124	3.158	0.001606	**
## countryMalta	-0.609981	0.108358	-5.629	1.99e-08	***
## countryMauritania	0.491059	0.122212	4.018	6.03e-05	***
## countryMauritius	-1.193353	0.105848	-11.274	< 2e-16	***
## countryMexico	0.117262	0.103012	1.138	0.255080	
## countryMoldova	0.346219	0.121055	2.860	0.004268	**

## countryMongolia	0.121734	0.117991	1.032	0.302296	
## countryMontenegro	0.026979	0.122202	0.221	0.825287	
## countryMorocco	0.394475	0.104424	3.778	0.000162	***
## countryMozambique	0.539318	0.116652	4.623	3.95e-06	***
## countryMyanmar	0.582758	0.112491	5.181	2.37e-07	***
## countryNamibia	0.226910	0.110361	2.056	0.039871	*
## countryNepal	0.444661	0.110266	4.033	5.67e-05	***
## countryNetherlands	-1.142856	0.111125	-10.284	< 2e-16	***
## countryNew Zealand	-2.281418	0.109216	-20.889	< 2e-16	***
## countryNicaragua	-0.106834	0.105764	-1.010	0.312527	
## countryNiger	0.428927	0.105861	4.052	5.23e-05	***
## countryNigeria	0.294684	0.105358	2.797	0.005195	**
## countryNorway	-0.722728	0.110340	-6.550	6.85e-11	***
## countryOman	-0.372122	0.110428	-3.370	0.000763	***
## countryPakistan	0.350047	0.103329	3.388	0.000715	***
## countryPanama	-0.636665	0.104447	-6.096	1.24e-09	***
## countryPap. New Guinea	0.123765	0.108052	1.145	0.252135	
## countryParaguay	0.228967	0.107115	2.138	0.032639	*
## countryPeru	-0.503021	0.104209	-4.827	1.46e-06	***
## countryPhilippines	-0.066602	0.103069	-0.646	0.518215	
## countryPoland	0.031432	0.107371	0.293	0.769743	
## countryPortugal	-0.373475	0.105585	-3.537	0.000411	***
## countryQatar	-0.472017	0.146333	-3.226	0.001272	**
## countryRomania	-0.231318	0.107062	-2.161	0.030814	*
## countryRussia	0.467090	0.108124	4.320	1.62e-05	***
## countryRwanda	0.014587	0.111308	0.131	0.895744	
## countrySaudi Arabia	0.402933	0.146499	2.750	0.005991	**
## countrySenegal	0.384667	0.105076	3.661	0.000256	***
## countrySerbia	0.346244	0.121361	2.853	0.004363	**
## countrySeychelles	-0.087755	0.178940	-0.490	0.623880	
## countrySierra Leone	0.500702	0.106206	4.714	2.55e-06	***
## countrySingapore	-2.768489	0.106243	-26.058	< 2e-16	***
## countrySlovak Rep	-0.430497	0.110138	-3.909	9.51e-05	***
## countrySlovenia	0.099986	0.111749	0.895	0.371009	
## countrySouth Africa	-0.066630	0.102938	-0.647	0.517505	
## countrySpain	-0.611769	0.103882	-5.889	4.36e-09	***
## countrySri Lanka	0.294596	0.104599	2.816	0.004891	**
## countrySudan	0.955405	0.333183	2.868	0.004169	**
## countrySuriname	0.415918	0.144413	2.880	0.004007	**
## countrySwaziland	0.385456	0.145906	2.642	0.008293	**
## countrySweden	-0.742029	0.112618	-6.589	5.30e-11	***

```

## countrySwitzerland      -2.323395    0.107166 -21.680 < 2e-16 ***
## countrySyria             0.492070    0.105831   4.650 3.48e-06 ***
## countryTaiwan            -0.730979    0.103353  -7.073 1.92e-12 ***
## countryTajikistan        0.557264    0.144027   3.869 0.000112 ***
## countryTanzania          0.390325    0.104826   3.724 0.000200 ***
## countryThailand           0.064364    0.102364   0.629 0.529550
## countryTimor-Leste       0.295515    0.153809   1.921 0.054798 .
## countryTogo               0.438515    0.106753   4.108 4.11e-05 ***
## countryTrinidad & Tob.   -0.077928    0.105469  -0.739 0.460046
## countryTunisia           0.209787    0.103266   2.032 0.042300 *
## countryTurkey            0.221918    0.103829   2.137 0.032660 *
## countryUganda            -0.133218    0.105984  -1.257 0.208874
## countryUkraine           0.459295    0.111722   4.111 4.05e-05 ***
## countryUnit. Arab Em.    -0.793754    0.106595  -7.446 1.28e-13 ***
## countryUnited Kingdom    -1.919490    0.108386 -17.710 < 2e-16 ***
## countryUnited States     -2.078305    0.106561 -19.503 < 2e-16 ***
## countryUruguay           -0.187698    0.104675  -1.793 0.073061 .
## countryVenezuela         0.022656    0.104474   0.217 0.828340
## countryVietnam           0.549396    0.116141   4.730 2.35e-06 ***
## countryYemen, Rep.       0.606033    0.144552   4.192 2.85e-05 ***
## countryZambia            0.104261    0.104529   0.997 0.318640
## countryZimbabwe          0.379070    0.106822   3.549 0.000394 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3223 on 2724 degrees of freedom
## (835 observations deleted due to missingness)
## Multiple R-squared:  0.8949, Adjusted R-squared:  0.8884
## F-statistic: 139.7 on 166 and 2724 DF, p-value: < 2.2e-16

```

Based on the results of the regression, an in government size by one unit decreases rank by 8.67%. This was found to be statistically significant at the 0.001 significance level. This result is significantly significant, because a small change in government size contributes to a larger change on the change in rank.

## LOG-LOG MODEL

The log-log regression that was run is as follows:

$$\log(\hat{rank}) = b_0 + b_1 * \log(government) \text{ size} + b_2 * \log(property \text{ rights}) + b_3 * \log(sound \text{ money}) + b_4 * \log(trade) + b_5$$

The results of this regression are as follows:

```
summary(log_log)
```

```
##
## Call:
## lm(formula = log(rank) ~ log(gov_size) + log(property_rights) +
##     log(sound_money) + log(trade) + log(regulation) + country,
##     data = econ_free_clean2, na.action = na.omit)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.34110 -0.13648  0.02969  0.17603  1.49399
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      5.466927   0.134686  40.590 < 2e-16 ***
## log(gov_size)    -0.479390   0.043930 -10.913 < 2e-16 ***
## log(property_rights) -0.330757   0.039079  -8.464 < 2e-16 ***
## log(sound_money)  -0.266231   0.028524  -9.333 < 2e-16 ***
## log(trade)        0.180064   0.031735   5.674 1.54e-08 ***
## log(regulation)   0.110889   0.063369   1.750 0.080249 .
## countryAlgeria     0.587902   0.111660   5.265 1.51e-07 ***
## countryAngola      0.574333   0.125458   4.578 4.91e-06 ***
## countryArgentina   0.453111   0.105533   4.294 1.82e-05 ***
## countryArmenia    -0.693375   0.119990  -5.779 8.39e-09 ***
## countryAustralia  -1.757454   0.106343 -16.526 < 2e-16 ***
## countryAustria    -1.127859   0.110495 -10.207 < 2e-16 ***
## countryAzerbaijan  0.547219   0.121975   4.486 7.55e-06 ***
## countryBahamas    -0.123300   0.108954  -1.132 0.257873
## countryBahrain    -0.418405   0.108121  -3.870 0.000112 ***
## countryBangladesh  0.571227   0.110140   5.186 2.30e-07 ***
## countryBarbados    0.344234   0.108681   3.167 0.001555 **
## countryBelarus     0.712234   0.338509   2.104 0.035467 *
## countryBelgium    -0.898006   0.109077  -8.233 2.81e-16 ***
## countryBelize      0.163912   0.112757   1.454 0.146152
## countryBenin       0.491149   0.109934   4.468 8.23e-06 ***
## countryBhutan      0.400644   0.182685   2.193 0.028386 *
## countryBolivia     0.335420   0.108158   3.101 0.001947 **
## countryBosnia and Herzegovina 0.345117   0.124341   2.776 0.005548 **
## countryBotswana    -0.122975   0.109668  -1.121 0.262243
## countryBrazil      0.496198   0.108228   4.585 4.75e-06 ***
```

## countryBrunei Darussalam	0.184089	0.149349	1.233	0.217830	
## countryBulgaria	-0.029416	0.109454	-0.269	0.788139	
## countryBurkina Faso	0.578789	0.125088	4.627	3.88e-06	***
## countryBurundi	0.568438	0.109027	5.214	1.99e-07	***
## countryCambodia	0.243544	0.146734	1.660	0.097077	.
## countryCameroon	0.496485	0.107053	4.638	3.69e-06	***
## countryCanada	-2.053771	0.107021	-19.190	< 2e-16	***
## countryCape Verde	0.526500	0.147892	3.560	0.000377	***
## countryCentral Afr. Rep.	0.574236	0.111569	5.147	2.84e-07	***
## countryChad	0.614724	0.111164	5.530	3.51e-08	***
## countryChile	-1.102028	0.106252	-10.372	< 2e-16	***
## countryChina	0.485341	0.109935	4.415	1.05e-05	***
## countryColombia	0.321154	0.106496	3.016	0.002588	**
## countryCongo, Dem. R.	0.441375	0.115160	3.833	0.000130	***
## countryCongo, Rep. Of	0.354213	0.111075	3.189	0.001444	**
## countryCosta Rica	-0.439307	0.105986	-4.145	3.50e-05	***
## countryCote d'Ivoire	0.499391	0.108955	4.583	4.78e-06	***
## countryCroatia	0.219771	0.112430	1.955	0.050716	.
## countryCyprus	-0.498315	0.107569	-4.632	3.78e-06	***
## countryCzech Rep.	-0.205973	0.112702	-1.828	0.067721	.
## countryDenmark	-1.501208	0.112579	-13.335	< 2e-16	***
## countryDominican Rep.	0.157655	0.106192	1.485	0.137762	
## countryEcuador	0.455030	0.106596	4.269	2.03e-05	***
## countryEgypt	0.552506	0.106976	5.165	2.58e-07	***
## countryEl Salvador	-0.351628	0.107376	-3.275	0.001071	**
## countryEstonia	-1.281122	0.111898	-11.449	< 2e-16	***
## countryEthiopia	0.794965	0.123693	6.427	1.53e-10	***
## countryFiji	0.198016	0.112157	1.766	0.077587	.
## countryFinland	-1.403584	0.108880	-12.891	< 2e-16	***
## countryFrance	-0.553754	0.108653	-5.097	3.70e-07	***
## countryGabon	0.480226	0.107585	4.464	8.39e-06	***
## countryGambia, The	0.087522	0.146864	0.596	0.551264	
## countryGeorgia	-0.981343	0.118237	-8.300	< 2e-16	***
## countryGermany	-1.138009	0.107073	-10.628	< 2e-16	***
## countryGhana	0.401725	0.107575	3.734	0.000192	***
## countryGreece	-0.056924	0.105324	-0.540	0.588922	
## countryGuatemala	-0.294051	0.106445	-2.762	0.005776	**
## countryGuinea	0.783878	0.183262	4.277	1.96e-05	***
## countryGuinea-Bissau	0.439290	0.116142	3.782	0.000159	***
## countryGuyana	0.327927	0.115472	2.840	0.004547	**
## countryHaiti	0.258080	0.114072	2.262	0.023749	*

## countryHonduras	-0.034872	0.107683	-0.324	0.746086	
## countryHong Kong	-3.726661	0.105558	-35.304	< 2e-16	***
## countryHungary	-0.174851	0.109936	-1.590	0.111843	
## countryIceland	-0.613279	0.107958	-5.681	1.48e-08	***
## countryIndia	0.451964	0.105116	4.300	1.77e-05	***
## countryIndonesia	0.237997	0.104472	2.278	0.022799	*
## countryIran	0.688478	0.110083	6.254	4.63e-10	***
## countryIraq	0.711594	0.339381	2.097	0.036109	*
## countryIreland	-1.715347	0.106685	-16.079	< 2e-16	***
## countryIsrael	-0.224529	0.105904	-2.120	0.034086	*
## countryItaly	-0.337540	0.105806	-3.190	0.001438	**
## countryJamaica	-0.181074	0.106167	-1.706	0.088206	.
## countryJapan	-1.136835	0.106378	-10.687	< 2e-16	***
## countryJordan	-0.324989	0.107029	-3.036	0.002417	**
## countryKazakhstan	0.279991	0.123512	2.267	0.023474	*
## countryKenya	0.048969	0.104311	0.469	0.638786	
## countryKorea, South	-0.400908	0.105211	-3.811	0.000142	***
## countryKuwait	-0.076906	0.108764	-0.707	0.479568	
## countryKyrgyz Republic	0.388823	0.122938	3.163	0.001580	**
## countryLaos	0.484589	0.205417	2.359	0.018392	*
## countryLatvia	-0.724457	0.110962	-6.529	7.89e-11	***
## countryLebanon	0.320316	0.147105	2.177	0.029532	*
## countryLesotho	0.550979	0.125150	4.403	1.11e-05	***
## countryLiberia	0.487321	0.205353	2.373	0.017709	*
## countryLibya	0.697700	0.183879	3.794	0.000151	***
## countryLithuania	-0.627757	0.110779	-5.667	1.61e-08	***
## countryLuxembourg	-1.487406	0.109535	-13.579	< 2e-16	***
## countryMacedonia	0.152904	0.119102	1.284	0.199318	
## countryMadagascar	0.508436	0.108962	4.666	3.22e-06	***
## countryMalawi	0.510089	0.107083	4.763	2.00e-06	***
## countryMalaysia	-0.152906	0.105514	-1.449	0.147412	
## countryMali	0.460134	0.106883	4.305	1.73e-05	***
## countryMalta	-0.634510	0.108831	-5.830	6.19e-09	***
## countryMauritania	0.627261	0.124197	5.051	4.70e-07	***
## countryMauritius	-1.210775	0.107600	-11.253	< 2e-16	***
## countryMexico	0.204322	0.104819	1.949	0.051364	.
## countryMoldova	0.433827	0.123103	3.524	0.000432	***
## countryMongolia	0.158614	0.120180	1.320	0.187015	
## countryMontenegro	0.097617	0.123759	0.789	0.430317	
## countryMorocco	0.484054	0.106225	4.557	5.42e-06	***
## countryMozambique	0.658725	0.118626	5.553	3.08e-08	***

## countryMyanmar	0.804901	0.116853	6.888	7.00e-12	***
## countryNamibia	0.299639	0.110506	2.712	0.006740	**
## countryNepal	0.558447	0.112053	4.984	6.63e-07	***
## countryNetherlands	-1.256603	0.109941	-11.430	< 2e-16	***
## countryNew Zealand	-2.373282	0.107338	-22.110	< 2e-16	***
## countryNicaragua	-0.042386	0.110332	-0.384	0.700884	
## countryNiger	0.542448	0.108098	5.018	5.56e-07	***
## countryNigeria	0.443836	0.107032	4.147	3.48e-05	***
## countryNorway	-0.841685	0.109235	-7.705	1.82e-14	***
## countryOman	-0.296892	0.110604	-2.684	0.007313	**
## countryPakistan	0.480151	0.105284	4.561	5.33e-06	***
## countryPanama	-0.615322	0.106116	-5.799	7.46e-09	***
## countryPap. New Guinea	0.262710	0.108787	2.415	0.015805	*
## countryParaguay	0.265919	0.109172	2.436	0.014923	*
## countryPeru	-0.490939	0.107274	-4.576	4.94e-06	***
## countryPhilippines	-0.020597	0.105137	-0.196	0.844697	
## countryPoland	0.059200	0.108859	0.544	0.586610	
## countryPortugal	-0.413216	0.105941	-3.900	9.84e-05	***
## countryQatar	-0.427320	0.148122	-2.885	0.003946	**
## countryRomania	-0.197771	0.108803	-1.818	0.069220	.
## countryRussia	0.533090	0.110118	4.841	1.36e-06	***
## countryRwanda	0.055589	0.113152	0.491	0.623273	
## countrySaudi Arabia	0.490442	0.148667	3.299	0.000983	***
## countrySenegal	0.510237	0.106939	4.771	1.93e-06	***
## countrySerbia	0.446416	0.123250	3.622	0.000298	***
## countrySeychelles	-0.052977	0.182354	-0.291	0.771442	
## countrySierra Leone	0.564183	0.108811	5.185	2.32e-07	***
## countrySingapore	-2.875776	0.105519	-27.254	< 2e-16	***
## countrySlovak Rep	-0.412935	0.111392	-3.707	0.000214	***
## countrySlovenia	0.096966	0.113040	0.858	0.391077	
## countrySouth Africa	0.010160	0.104435	0.097	0.922509	
## countrySpain	-0.621861	0.104936	-5.926	3.50e-09	***
## countrySri Lanka	0.402735	0.106205	3.792	0.000153	***
## countrySudan	1.068992	0.339678	3.147	0.001667	**
## countrySuriname	0.484356	0.147143	3.292	0.001009	**
## countrySwaziland	0.509653	0.148124	3.441	0.000589	***
## countrySweden	-0.878679	0.113337	-7.753	1.26e-14	***
## countrySwitzerland	-2.460106	0.106637	-23.070	< 2e-16	***
## countrySyria	0.613792	0.107986	5.684	1.46e-08	***
## countryTaiwan	-0.780502	0.104623	-7.460	1.16e-13	***
## countryTajikistan	0.601907	0.146877	4.098	4.29e-05	***

```

## countryTanzania      0.474139    0.106616    4.447 9.05e-06 ***
## countryThailand      0.129006    0.103968    1.241 0.214777
## countryTimor-Leste   0.387565    0.156545    2.476 0.013357 *
## countryTogo          0.518201    0.109341    4.739 2.26e-06 ***
## countryTrinidad & Tob. 0.007549    0.106959    0.071 0.943736
## countryTunisia       0.314315    0.104682    3.003 0.002702 **
## countryTurkey        0.296432    0.105501    2.810 0.004994 **
## countryUganda        -0.082825    0.109153   -0.759 0.448039
## countryUkraine       0.602227    0.112805    5.339 1.01e-07 ***
## countryUnit. Arab Em. -0.745929    0.107781   -6.921 5.59e-12 ***
## countryUnited Kingdom -1.989393    0.107327  -18.536 < 2e-16 ***
## countryUnited States  -2.156323    0.106228  -20.299 < 2e-16 ***
## countryUruguay       -0.149542    0.106153   -1.409 0.159027
## countryVenezuela     0.158439    0.106672    1.485 0.137585
## countryVietnam       0.644551    0.117824    5.470 4.90e-08 ***
## countryYemen, Rep.   0.669858    0.147555    4.540 5.88e-06 ***
## countryZambia        0.129031    0.106553    1.211 0.226018
## countryZimbabwe      0.522366    0.113790    4.591 4.62e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3291 on 2706 degrees of freedom
## (853 observations deleted due to missingness)
## Multiple R-squared:  0.8906, Adjusted R-squared:  0.8839
## F-statistic: 132.7 on 166 and 2706 DF, p-value: < 2.2e-16

```

Based on the results of the regression, a 1% increase in government size decreases the rank by 47.94%. This was found to be statistically significant at the 0.001 significance level. This result is significantly significant, because a small change in government size contributes to a large change on the change in rank.