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Government size and economic freedom as determinants of growth: Evidence based on the Heritage Foundation data

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ABSTRACT

The objective of this paper was to find out if government size is detrimental to economic growth as it is often claimed. This issue was investigated by using extreme bounds analysis to overcome the problem of model uncertainty and the sensitivity of the results to the selected set of explanatory variables. By also using non-nested model selection tests as applied to data obtained from the Heritage Foundation (an American conservative think tank based in Washington, D.C. that is primarily geared toward public policy), cross-sectional evidence was presented in support of the proposition that government size is detrimental to economic growth. In particular, government spending turns out to be the most important determinant of economic growth, dominating the rule of law, regulatory efficiency and market openness. Two caveats must be borne in mind when these results are interpreted: (i) what matters is the quality, not the quantity, of government spending; and (ii) a big government can be good for business. The results presented in this study provide further evidence on a controversial issue and some guidelines for policy makers concerned with economic growth.

Contribution/Originality: The contribution of this paper lies in the use of a particular set of tests that have not been used in this strand of literature before. Another contribution is the identification of two caveats to the finding that government size is detrimental to economic growth.

1. INTRODUCTION

Since 1995 the Heritage Foundation, a conservative think-tank based in Washington D.C. and conducting research on public policy, has been calculating and reporting an index of economic freedom comprising measures of adherence to the rule of law, the size of government, regulatory efficiency and market openness. The purpose for which this index is produced is to demonstrate the validity of an ideologically-held belief that economic freedom makes an economy grow and prosper and that the free-market system, which is rooted in economic freedom, "has fueled unprecedented economic growth and development around the world" (Miller, Kim, & Roberts, 2019). The index is calculated as an average of 12 indicators taking values between 0 and 100, such that a higher value of any indicator implies a higher level of economic freedom. Therefore, all of the indicators should be positively correlated with economic growth.

The proposition that free markets boost growth, which is attributed to Smith (1776), is not accepted universally. Free marketers would argue that a free market is conducive to growth because all resources are owned by individuals, such that the decisions about how to allocate resources are made by those individuals rather than the

government. As a result, the argument goes, a free-market system boosts business efficiency, productivity and innovation. The Heritage Foundation argues that "a government's insulation from market discipline often leads to bureaucracy, lower productivity, inefficiency, and mounting public debt that imposes an even greater burden on future generations" (Miller et al., 2019).

Those who think otherwise would argue that there is no reason why a highway owned and operated by the public sector, which people can use for free as it is financed by taxpayers, is more efficient and innovative than a similar highway owned and operated by a private firm demanding exorbitant toll charges. Economic history shows that the Soviet Union and China grew very rapidly without much in terms of economic or political freedom. Even the growth driven by the industrialization of Britain and America in the 18th, 19th and 20th centuries was achieved under conditions of closed economies as both countries adopted high levels of tariffs and imposed quantitative controls on international trade.

Government size and economic freedom are related, in the sense that the smaller the government, the greater will be economic freedom, or at least this is what current thinking indicates. One of the principles of neoliberalism is "starving the beast", where the "beast" is the government or the public sector, which means reducing the power and size of the government by limiting the financial resources allocated to the public sector and allowing the private sector to operate with minimal restrictions. It follows that a small government with limited financial resources is associated with a large degree of economic freedom and vice versa.

The objective of this paper was to present cross-sectional evidence on the proposition that economic freedom, which requires a small government, is conducive to growth. Based on its data, the Heritage Foundation has no doubt that "there is a robust relationship between improvements in economic freedom and economic growth" and that "the relationship between gains in economic freedom and rates of economic growth is consistently positive". More specifically, the Foundation reports that the economic growth rates of countries where economic freedom has expanded the most are at least 30% higher than those of countries where freedom has stagnated or slowed. For this purpose, 12 indicators were used to construct the economic freedom index, as reported by the Heritage Foundation, and as separate explanatory variables to explain growth in a model that encompasses the catch-up hypothesis. The novelty of this study lies in the use of a technique that overcomes the problem of model uncertainty, which arises in studies of this kind.

2. LITERATURE REVIEW

2.1. The Effect of Government Size on Growth

Economic growth is affected by government size because governments tend to absorb a significant portion of the available resources. Conjectural history tells us that high levels of economic growth have been attained with government intervention and that in the absence of a role for the government, little wealth was accumulated. However, government intervention is not a sufficient condition for economic growth to take off because it may lead to the monopolization of the allocation of resources and other important economic decisions. However, economic growth tends to be limited in the absence of government intervention because this means the absence of the rule of law, property rights, and similar factors that are essential for growth. When the government is extremely big, the law of diminishing returns is set in motion (for example, by increased taxation required to finance the government's growing burden) which has adverse effects on human economic behavior (particularly the effect on consumption decisions).

The existing literature on the relationship between government size and economic growth produces mixed results, which can be justified theoretically. Negative effects may arise out of some inefficiencies, crowding-out effects, excess burden of taxation, distortion of the incentives systems and interventions in free markets (Bajo-Rubio, 2000; Barro, 1991). Slemrod, Gale, and Easterly (1995) and Tanzi and Zee (1997) find a negative impact if the size of government exceeds a certain threshold. The rationale behind this argument is that in countries with big

governments, the share of public expenditure designed to promote private sector productivity is typically smaller than in countries with small governments (Fölster & Henrekson, 2001). On the other hand, government activities may also have positive effects due to beneficial externalities, the development of a legal, administrative and economic infrastructure and interventions to offset market failures (Dalamagas, 2000; Ghali, 1999).

Four views can be found in the literature on the relationship between government size and economic growth. The first is the "government size-led economic growth view" or the "supply-leading response", which is also known as the "Keynesian view". According to this view, government size causes economic growth, and not the other way round (for example, (Ebaidalla, 2013; Ghali, 1999; Loizides & Vamvoukas, 2005)). Exactly the opposite effect is envisaged by the "growth-led government size view", which is also known as the "demand-following response" or "Wagner's Law". According to this second view, the government is inefficient to the extent that it cannot drive economic growth—rather, economic growth boosts government size as a result of the response to the burden placed on it by a growing economy (for example, (Bohl, 1996; Islam, 2001; Samudram, Nair, & Vaithilingam, 2009; Thabane & Lebina, 2016)). The third view is the "bidirectional causality view" or the "feedback response", which implies that government size and economic growth cause each other in a feedback response fashion (for example, (Abu-Bader & Abu-Qarn, 2003; Abu-Eideh, 2015; Singh & Sahni, 1984; Wu, Tang, & Lin, 2010)). The fourth view is the "neutrality view" whereby government size and economic growth are independent of, and therefore do not cause, each other (for example, (Afxentiou & Serletis, 1996; Ansari, Gordon, & Akuamoah, 1997; Taban, 2010)).

Each one of these four views has found some support in one study or another, leading to a mixed bag of results. The results are invariably sensitive to many factors, including the underlying countries, sample choice, estimation techniques and definitions of the variable. The results are also sensitive to model specification and the set of explanatory variables used in the regression. In this paper, the technique of extreme bounds analysis (EBA) is used to overcome the problem of model sensitivity, which is produced by the inclusion or exclusion of certain explanatory variables.

2.2 The Effect of Economic Freedom on Growth

A positive association between economic freedom and economic growth has been documented by Ayal and Karras (1998); Compton, Giedeman, and Hoover (2011); Doucouliagos and Ulubasoglu (2006); Gwartney, Lawson, and Holcombe (1999); Hall and Lawson (2014); Rode and Coll (2012); Williamson and Mathers (2011) and by Xu and Li (2008). However, it is not as "done and dusted" as it sounds because a number of issues remain unsettled. The first issue is that the direction of causation (whether causation runs from economic freedom to economic growth, or vice versa). For example, Justesen (2008) finds results indicating that some (but not all) aspects economic freedom affect economic growth and investment and that there is only weak evidence can be found to support the proposition that growth affects economic freedom.

Another issue that arises in this strand of research is whether economic freedom affects growth directly or indirectly through its impact on investment. Although the effect of economic freedom on investment has received some attention (for example, (Dawson, 2003; Gwartney, Holcombe, & Lawson, 2006)), it has not been subject to as much scrutiny as the freedom-growth nexus. This is why it is still unclear whether economic freedom affects growth directly or indirectly through the investment channel.

Another issue is that economic freedom is often measured by using broad composite indices comprising a large number of variables. Berggren (2003) comments on the use of composite indices by wondering what is actually measured when a large number of variables are combined. A related issue pertains to the construction of the economic freedom measures and the variables that should be included in indices of economic freedom. Also controversial is the relative weighting of these variables in the final index, and the proper statistical procedures for constructing an index of economic freedom. In this study, the index of economic freedom constructed by the Heritage Foundation is used in the empirical analysis. The components of economic freedom encompassed by the

index are grouped under four broad categories: (i) rule of law, (ii) government size, (iii) regulatory efficiency, and (iv) market openness. The rule of law is represented by three indices for property rights, judicial effectiveness and government integrity. Property rights refer to the recognition of private property rights and an effective rule of law to protect them. Judicial effectiveness requires a well-functioning legal framework to protect the rights of all citizens against infringement of the law by others, including the governments and powerful parties. Government integrity pertains to systemic corruption of government institutions by such practices as bribery, nepotism, cronyism, patronage, embezzlement, and graft.

The size of a government's spending is represented by three indices corresponding to tax burden, government spending, and fiscal health. Tax burden is measured as the tax revenue from all forms of taxation as a percentage of gross domestic product (GDP) Government spending is viewed by the Heritage Foundation as being "harmful to economic freedom". The underlying rationale is that government spending has to be financed by a higher level of taxation and entails an opportunity cost, which is the value of the consumption or investment that would have occurred had the resources involved been left in the private sector. The Foundation believes that "even if an economy achieves faster growth through more government spending, such economic expansion tends to be only temporary, distorting the market allocation of resources and private investment incentives". The third component of fiscal health is represented by the budget deficit that "reflects a government's commitment (or lack thereof) to sound financial management of resources, which is both essential for dynamic long-term economic expansion and critical to the advancement of economic freedom". The underlying argument is that "deviations from sound fiscal positions often disturb macroeconomic stability, induce economic uncertainty, and thus limit economic freedom" (Miller et al., 2019). The components of regulatory efficiency are business freedom, labor freedom, and monetary freedom. Business freedom is represented by an individual's ability to establish and run an enterprise without undue interference from the state. Labor freedom is the ability of individuals to find employment opportunities and the ability of businesses to contract freely for labor and dismiss redundant workers when they are no longer needed. Monetary freedom requires a stable currency and market-determined prices. Indicators of monetary freedom include commitment to fighting inflation and central bank independence.

Market openness is measured by trade freedom, investment freedom and financial freedom. Trade freedom implies the absence of restrictions on the ability of individuals to interact freely as buyers or sellers in international markets. Investment freedom implies a free and open investment environment. Financial freedom implies an accessible and efficiently functioning formal financial system that ensures the availability of diversified savings, credit, payment, and investment services to individuals and businesses.

3. RESEARCH METHODOLOGY

3.1 Extreme Bounds Analysis (EBA)

The basic cross-sectional equation used to relate the economic growth rate to its determining variables is the following:

$$Y = \alpha + \gamma_0 X_0 + \sum_{i=1}^{12} \gamma_i X_i + \varepsilon \quad (1)$$

where Y is the 5-year average GDP growth rate, X_0 is GDP per capita and X_1 to X_{12} are the economic freedom indicators such that X_1 is property rights, X_2 is judicial effectiveness, X_3 is government integrity, X_4 is tax burden, X_5 is government spending, X_6 is fiscal health, X_7 is business freedom, X_8 is labor freedom, X_9 is monetary freedom, X_{10} is trade freedom, X_{11} is investment freedom, and X_{12} is financial freedom. X_0 is added to the list of explanatory variables to encompass the catch-up (or convergence) hypothesis that countries with low GDP per capita tend to grow more rapidly than those with high GDP per capita, implying that all economies will eventually converge in terms of per capita income (see, for example, Barro (1996)).

Straight cross sectional regressions are problematical because they are subject to the Leamer critique that the results are sensitive to the selected set of explanatory variables. This problem arises because theory is not adequately explicit about what variables that should appear in the "true" model. To circumvent this problem, Leamer (1983); Leamer (1985) suggests the use of extreme bounds analysis (EBA) to find out if the determinants of the dependent variable are robust, in which case the researcher would look for robustness as opposed to statistical significance. By calculating upper and lower bounds for the parameter of interest from all possible combinations of potential explanatory variables, it is possible to assess and report the sensitivity of the estimated coefficients to specification changes.

EBA is based on a linear regression of the form

$$Y = \alpha + \gamma_0 X_0 + \beta Q + \sum_{i=1}^{3} \gamma_i Z_i + \varepsilon \quad (2)$$

where X_0 is the free variable that is always included in the regression because its importance has been established by previous studies (and because it makes sense theoretically or at least intuitively), Q is the variable whose robustness is under consideration (the variable of interest), and Z_i is a potentially important variable. If $X = \{X_1, \cdots, X_{12}\}$, then $Q \in X$ and $Z \in X$, such that $Q \neq X$.

The procedure involves varying the set of Z variables to find the widest range of coefficients on the variable of interest, β, that standard tests of significance do not reject. If the extreme (minimum and maximum) values remain significant and of the same sign, then one can infer that the result (and hence, the variable of interest) is "robust". Otherwise, the variable is "fragile". In other words, for a variable of interest to be robust, $\beta_{\min}$ and $\beta_{\max}$ must be significant and of the same sign.

Sala-i-Martin (1997) suggests a refinement of the procedure by departing from the labelling of variables as robust and fragile, opting instead to examine the entire distribution of β. Specifically, his procedure is based on the fraction of the density function lying on each side of zero, CDF (0). If 95% of the density function lies to the right of zero, the underlying variable is considered robust. The cumulative distribution function is calculated from the weighted average of the point estimates of β where the weights are integrated likelihoods (for details, see Sala-i-Martin (1997)). The CDF is computed under the assumptions of normality and non-normality of the distribution of the estimated β.

3.2 Variable Addition and Non-Nested Model Selection Tests

The basic regression equation used to conduct variable addition tests is the following:

$$Y = \alpha + \gamma_0 X_0 + \beta_5 X_5 + \varepsilon \quad (3)$$

Any of the remaining variables is added to Equation 3 to find out if it makes a difference for the explanatory power of the equation. Hence:

$$Y = \alpha + \gamma_0 X_0 + \beta_5 X_5 + \gamma_i X_i + \varepsilon \quad (4)$$

For $i=1,\cdots,12$, such that $i\neq 5$. Three test statistics can be calculated from the residual sums of squares of Equations 3 and 4: a Lagrange multiplier (LM) test statistic with a χ^2 distribution, a Likelihood ratio (LR) test statistic with a χ^2 distribution, and a test statistic with an *F* distribution. A significant test statistic indicates that the variable is important, in the sense that it contributes to the explanatory power of the model, over and above the contribution made by X_0 and X_5.

Non-nested model selection tests are used to compare the explanatory power of government spending with other economic indicators. For this purpose, two non-nested models (M1 and M2) are specified as follows:

$$\text{M1: } Y=\alpha+\gamma_5 X_5+\varepsilon \tag{5}$$

$$\text{M2: } Y=\alpha+\sum_{i=1}^{12}\gamma_i X_i+\varepsilon \tag{6}$$

where $i=1,\cdots,12$, such that $i\neq 5$. Three test statistics are used: *NT*, *W* and *EN*. *NT* is the adjusted Cox test derived in Godfrey and Pesaran (1983), *W* is the Wald-type test proposed by Godfrey and Pesaran (1983) and *EN* is the encompassing test proposed, *inter alia*, by Mizon and Richard (1986). *NT* and *W* have a t distribution, whereas *EN* has an F distribution. A description of these tests can be found in Pesaran and Pesaran (2009). The tests are run both ways: M1 vs M2, where a significant test statistic implies that M2 is the preferred model, and M2 vs M1 where a significant test statistic implies that M1 is the preferred model.

4. DATA AND RESULTS

4.1 An Informal Examination of the Data

In 2019, the top "country" in terms of the freedom index was Hong Kong with a score of 90.2, followed by Singapore at 89.4. The last two countries on the list were Venezuela at 25.9 and North Korea at 5.9. While the Heritage Foundation explains growth in terms of the overall scores, individual indicators represent 12 separate explanatory variables in the analysis presented in this paper. The 2019 data on the freedom indicators, as well as a five-year average of growth rates, can be found in Miller et al. (2019) for 187 countries. Countries with missing observations on some variables (labelled "N/A") have been deleted, which reduces the sample size to 174.

Table 1. Correlation matrix.

	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
Y	1.00												
X_1	-0.23	1.00											
X_2	-0.21	0.82	1.00										
X_3	-0.20	0.86	0.88	1.00									
X_4	0.21	-0.25	-0.26	-0.30	1.00								
X_5	0.39	-0.40	-0.28	-0.39	0.36	1.00							
X_6	0.05	0.32	0.27	0.28	-0.10	0.02	1.00						
X_7	-0.26	0.78	0.69	0.73	-0.11	-0.33	0.27	1.00					
X_8	-0.13	0.40	0.39	0.38	0.10	-0.05	0.08	0.41	1.00				
X_9	-0.18	0.52	0.42	0.45	-0.21	-0.27	0.26	0.40	0.18	1.00			
X_{10}	-0.13	0.70	0.54	0.56	-0.07	-0.28	0.25	0.59	0.26	0.41	1.00		
X_{11}	-0.24	0.64	0.49	0.56	-0.28	-0.26	0.22	0.51	0.18	0.57	0.57	1.00	
X_{12}	-0.22	0.71	0.57	0.62	-0.19	-0.25	0.22	0.58	0.23	0.51	0.63	0.79	1.00

Note: Y: 5-year average GDP growth rate, X_1: Property rights, X_2: Judicial effectiveness, X_3: Government integrity, X_4: Tax burden, X_5: Government spending, X_6: Fiscal health, X_7: Business freedom, X_8: Labor freedom, X_9: Monetary freedom, X_{10}: Trade freedom, X_{11}: Investment freedom, X_{12}: Financial freedom.

It may be appropriate at this stage to examine the correlation matrix of the 12 economic freedom indicators and growth as reported in Table 1, bearing in mind that all of the freedom indicators are supposed to be positively correlated with the GDP growth rate. What we find is that most of the indicators are negatively correlated with the growth rate, with the notable exceptions of government spending (0.39) and tax burden (0.21). All of the three components of the rule of law appear to be negatively correlated with growth. Strong positive correlation can be found between property rights and most of the other indicators. Government spending is negatively correlated with most of the other indicators. For example, the correlation coefficient between government spending and business freedom is negative, implying that a financially disciplined government is less conducive to business freedom. These, however, are not partial but rather total correlations, reflecting how growth responds to changes in a particular indicator when all other indicators change at the same time. More rigorous evidence is required to derive inference properly.

4.2. The Results of Extreme Bounds Analysis

It is obvious from Equation 2 that the number of Z variables included in each regression is 3. This means that the exercise involves running 165 regressions for each of the 12 variables of interest, which gives a total of 1980 regressions.

Table 2. Leamer's EBA results.

Distribution of estimated coefficients (%)					
Variable	**Negative**	**Positive**	**Significant**	**Significant and negative**	**Significant and positive**
X_1	37.0	63.0	1.2	0.0	1.2
X_2	37.0	63.0	0.0	0.0	0.0
X_3	0.0	100.0	23.6	0.0	23.6
X_4	0.0	100.0	74.5	0.0	74.5
X_5	0.0	100.0	100.0	0.0	100.0
X_6	0.0	100.0	49.1	0.0	49.1
X_7	100.0	0.0	18.2	18.2	0.0
X_8	100.0	0.0	0.6	0.6	0.0
X_9	97.0	3.0	0.0	0.0	0.0
X_{10}	0.0	100.0	1.8	0.0	1.8
X_{11}	100.0	0.0	1.2	1.2	0.0
X_{12}	69.1	30.9	0.0	0.0	0.0
Extreme values with t-statistics					
Variable	$\beta_{\min}$	t statistic	$\beta_{\max}$	t statistic	Robust/Fragile
X_1	-0.030	-1.48	0.032	1.97	Fragile
X_2	-0.029	-1.42	0.023	1.58	Fragile
X_3	0.002	0.16	0.045	2.36	Fragile
X_4	0.011	0.87	0.049	3.88	Fragile
X_5	0.025	3.31	0.037	5.08	Robust
X_6	0.005	1.07	0.012	2.34	Fragile
X_7	-0.047	-2.77	-0.002	-0.17	Fragile
X_8	-0.023	-2.06	-0.001	-0.13	Fragile
X_9	-0.039	-1.48	0.004	0.15	Fragile
X_{10}	0.008	0.42	0.044	1.95	Fragile
X_{11}	-0.020	-2.01	-0.003	-0.29	Fragile
X_{12}	-0.017	-1.30	0.010	0.71	Fragile

In Table 2 the results of Leamer's traditional EBA are reported. The top part of the table shows the distribution of the estimated coefficients on the variables of interest in the sense of the frequency of positive, negative, significant and insignificant coefficients. For a variable to be robust, the estimated coefficient must be a 100% significant and positive or significant and negative. The only variable satisfying this condition is X_5,

government spending, and this is why it is the only variable appearing as robust in the bottom half of the table. The coefficient on this variable does not change sign and significance, producing t statistics ranging between 3.31 for $\beta_{\min}$ and 5.08 for $\beta_{\max}$. All of the other variables are fragile.

Leamer's test is rather difficult to pass as one regression out of 1980 may make the difference between robustness and fragility. This is why the results of the less stringent test of Sala-i-Martin are reported in Table 3 where the CDF determines fragility and robustness. In this case, two more variables turn out to be robust at the 5% level because more than 95% of the CDF falls to the right of zero, under the assumption of normality and otherwise. These are X_4 (tax burden) and X_6 (fiscal health). Thus, all of the three variables representing the size of government are robust and related positively to economic growth. No other indicator of economic freedom is robust because none of them produce a CDF of 95 or more. There seems to be strong evidence for the proposition that big government retards economic growth.

Table 3. The Sala-i-Martin EBA results under normality and otherwise.

Variable	CDF (N)	CDF (G)	Direction	Robust/Fragile
X_1	64.25	62.39	+	Fragile
X_2	50.25	53.91	+	Fragile
X_3	94.78	92.55	+	Fragile
X_4	99.53	97.39	+	Robust
X_5	100.00	100.00	+	Robust
X_6	96.44	95.56	+	Robust
X_7	93.88	91.15	-	Fragile
X_8	82.82	81.19	-	Fragile
X_9	73.48	72.29	-	Fragile
X_{10}	91.52	90.46	+	Fragile
X_{11}	88.94	87.49	-	Fragile
X_{12}	61.80	61.49	-	Fragile

Note: CDF (N) and CDF (G) are the cumulative distribution functions under normal (N) and general (G) distribution, respectively.

4.3 The Results of Variable Addition and Non-Nested Model Selection Tests

The EBA results show that government spending is the most important of the 12 freedom indicators, even more important than the other two components of government size. In this section, variable addition and non-nested model selection tests are used to confirm this result.

Table 4. Variable addition tests.

Explanatory variable	LM $\chi^2(1)$	LR $\chi^2(1)$	$F(1,169)$
X_1	0.66	0.66	0.65
X_2	0.08	0.08	0.08
X_3	2.24	2.26	2.22
X_4	1.50	1.51	1.48
X_6	2.04	2.06	2.02
X_7	0.50	0.51	0.49
X_8	0.82	0.82	0.81
X_9	0.13	0.13	0.12
X_{10}	2.19	2.21	2.17
X_{11}	0.86	0.86	0.84
X_{12}	0.16	0.16	0.15

Note: LM- Lagrange multiplier; LR- Likelihood ratio The 5% critical values for $F(1,169)$, and $\chi^2(1)$ are 3.89 and 3.84, respectively.

The results of variable addition tests are presented in Table 4. In no case is any of the test statistics significant, implying that none of the remaining variables adds significantly to the explanatory power of Equation 3 in which

the growth rate depends on GDP per capita and government spending. In Table 5 we can see the results of non-nested model selection tests, such that M1 contains government spending as the only explanatory variable whereas M2 contains one or more of the remaining variables. When M1 is tested against M2, none of the test statistics is significant, as implied by the p-values, which means that M1 cannot be rejected against M2. When, on the other hand, when M2 is tested against M1, all test statistics are significant, implying that M2 is rejected against M1. The results are unanimous in preferring M1 to M2, meaning that government spending on its own has a better explanatory power than all of the other variables put together.

Table 5. Non-nested model selection tests.

M1	M2	M1 vs M2			M2 vs M1		
		NT	***W***	***EN***	***NT***	***W***	***EN***
$X5$	X_1	-1.21 [0.23]	-1.19 [0.23]	1.41 [0.23]	-10.08 [0.00]	-9.36 [0.00]	21.03 [0.00]
X_5	X_1, X_2	-0.91 [0.36]	-0.90 [0.37]	1.04 [0.36]	-10.30 [0.00]	-9.57 [0.00]	21.47 [0.00]
X_5	X_1, X_2, X_3	-0.42 [0.66]	-0.42 [0.67]	1.26 [0.29]	-10.88 [0.00]	-10.10 [0.00]	23.15 [0.00]
X_5	X_1, X_2, X_3, X_4	-0.92 [0.36]	-0.90 [0.37]	1.21 [0.31]	-5.89 [0.00]	-5.37 [0.00]	10.95 [0.00]
X_5	X_1, X_2, X_3, X_4, X_6	-1.27 [0.21]	-1.24 [0.22]	1.24 [0.29]	-5.28 [0.00]	-4.85 [0.00]	9.14 [0.00]
X_5	X_1, X_2, X_3, X_4, X_6, X_7	-1.56 [0.12]	-1.51 [0.12]	1.67 [0.13]	-5.53 [0.00]	-5.07 [0.00]	9.56 [0.00]
X_5	X_1, X_2, X_3, X_4, X_6, X_7, X_8	-1.35 [0.18]	-1.32 [0.19]	1.63 [0.13]	-5.72 [0.00]	-5.23 [0.00]	10.13 [0.00]
X_5	X_1, X_2, X_3, X_4, X_6, X_7, X_8, X_9	-1.26 [0.21]	-1.23 [0.22]	1.49 [0.16]	-6.18 [0.00]	-5.71 [0.00]	9.89 [0.00]
X_5	X_1, X_2, X_3, X_4, X_6, X_7, X_8, X_9, X_{10}	-1.53 [0.13]	-1.49 [0.14]	1.49 [0.16]	-5.64 [0.00]	-5.21 [0.00]	9.06 [0.00]
X_5	X_1, X_2, X_3, X_4, X_6, X_7, X_8, X_9, X_{10}, X_{11}	-1.57 [0.12]	-1.53 [0.13]	1.73 [0.08]	-5.99 [0.00]	-5.52 [0.00]	10.04 [0.00]
X_5	X_1, X_2, X_3, X_4, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}	-1.46 [0.14]	-1.42 [0.14]	1.63 [0.10]	-6.01 [0.00]	-5.53 [0.00]	10.06 [0.00]

Note: p-values are placed in square brackets.
M1- Model1; M2-Model 2.
NT- Non-nested adjusted cox test, W is the Wald-type test and EN is the encompassing test.

5. DISCUSSION

The results presented in this paper show that, out of the 12 indicators of economic freedom calculated and reported by the Heritage Foundation, only three indicators that represent government size are important for economic growth, in the sense that big government retards growth. The three indicators are measures of government spending, tax burden and fiscal health. Out of these three variables, government spending is the most important determinant or retarder of growth. The results seem to provide strong support for the propositions put forward by the Heritage Foundation, albeit only with respect to the role played by government spending in particular and government size in general. The other nine indicators of economic freedom do not seem to matter, or that they are overwhelmed by the explanatory power of fiscal indicators.

This conclusion, however, should not be accepted without scrutiny because at least two caveats must be borne in mind. The first caveat is that the quantity of government spending must be considered in conjunction with its quality—that is, the target of government spending. It has long been established that growth benefits from government spending on health and education, which constitutes investment in human capital. The importance of human capital as a contributor to economic growth is recognized in endogenous growth models. Sharma (2018) suggests that human capital made inroads into growth framework following the endogenous growth revolution and that it is identified as one of the most important contributors to economic growth. Government spending on the

infrastructure is conducive to growth, a proposition that is supported by the observation that growth in Africa is hampered by the unavailability of good-quality infrastructure, particularly roads and railway networks. Government spending is bad for growth if it is directed away from health, education and the infrastructure towards less productive avenues, the most notorious of which is military expenditure. This seems to be the trend in the contemporary world, which may explain why government spending is bad for economic growth.

The second caveat follows from the argument that the free market system would not have appeared without the help of the government, which means that the two are not incompatible. For example, Gray (2009) points out that the free market would not have been created without the power of the government, suggesting that "a precondition for the nineteenth century British free market was the use of state power to transform common land into private property". Today, governments preserve the private sector and encourage moral hazard through bail-outs, bail-ins, purchases and subsidies. If the government is captured by corporate interests, which is invariably the case, big governments are good for "business freedom". This is probably why we saw earlier that the government spending indicator is negatively correlated with other indicators of economic freedom.

Furthermore, a big government is not necessarily conducive to inferior rule of law, regulatory inefficiency and market openness. Adherence to law and order may require a bigger police force and (government-operated) law enforcement agencies. Regulatory efficiency is determined by the choice between good regulation and bad regulation, which has nothing to do with government size (see, for example, Moosa (2015)). Likewise, market openness does not depend on whether the government is big or small. These propositions are supported by at least the correlations reported in Table 1.

6. CONCLUSION

The literature on the relationship between government size and economic growth is full of seemingly contradictory findings, which can be explained in terms of variations in model specification, estimation methods, data and definitions of variables. The model uncertainty problem is particularly acute, since one can never be sure which of the tens of potential explanatory variables for growth is to be included in the model. The model uncertainty problem is dealt with in this paper by using extreme bounds analysis.

The results presented in this paper show that government size (measured by government spending, tax burden and fiscal health) are important for economic growth, in the sense that big government retards growth. However, these results must not be taken at face value, as the quality of government spending may be what makes the difference between positive and negative effects of government spending on growth. The effect of the size of government on growth and economic performance in general constitutes an ideological issue on which the evidence seems to be invariably selective. Any evidence presented on the effect on economic growth of economic freedom, in general, and government size, in particular, should not be accepted without scrutiny, no matter how strong it may look.

The finding that that big government retards growth should not be translated into a policy decision to reduce the size of the government by privatizing everything under the sun. Certain industries must remain under public ownership for reasons other than the presumed efficiency of the private sector relative to the public sector. A number of reasons can be presented for some industries must remain under public ownership, including equity and consumer protection. For example, it is arguable that any essential product with a low elasticity of demand should be produced by the public sector, not by profit-maximizing firms. Like everything else in life, striking a balance between the private sector and the public sector is the most appropriate course of action.

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