Abstract
Considerable research has been offered as to the impact of measured levels of economic freedom on economic growth in national economies. However, much less attention has been devoted to the manner in which economic prosperity might foster economic liberties. The intent of this paper is to search for the direction of causation pertaining to economic expansion and increased measures of freedom. A panel study provided by the Fraser Institute serves as the primary source for the data for the index of economic freedom. Granger-causality methodology is used in the analysis. While past research has focused on several pertinent aspects pertaining to this relationship, it seems a little attention has been given to any differences in this relationship that might prevail across national levels of wealth. This paper addresses this unfortunate deficiency by separating the nations into quartiles and examining the economic growth-economic freedom relationship with and each sub-division.

JEL Codes: C5, O57
Key words: Economic Freedom, World Development, Granger Causality

1. Introduction:
With the recent economic misfortune that has struck many nations across the globe and currently threatens many more, there has occurred a re-emphasis in interest as to the forces that encourage economic prosperity and growth. Historically, research into this issue has focused on the role played by physical factors such as human capital, technological development, foreign investment and augmented capital stocks.

More recently, exploration into this matter has focused increasingly on institutional issues. Concerns such as economic and political freedom are more commonly recognized as influential factors bearing on economic prosperity and growth. Evidence abounds as to the positive relationship between economic growth and what might be defined in a myriad of forms as economic freedom.

Cole (2003), de Haan and Siermann (1998), Esposito and Zaleski (1999) and Campbell and Rogers (2007) as well as many of the researchers discussed throughout this paper have all reported possibly findings between economic freedom and economic affluence. Paakkonen (2010) rely on post-communist countries making their transition into market economies. He too reported indisputable advantages associated with economic freedom.

The conclusions reached by the preponderance of this research seem to confirm what Adam Smith promised us: that if economic agents are left to their own recourse in the absence of centrally-imposed economic constraints they will serve to benefit the economy at large. Thus, economic freedom and economic growth are found to exist hand-
in-hand. However, the vast majority of the research that has been done ignores directional causality. The question remains does economic freedom promote economic growth and, is the directionality reversed or is there feedback in that each precipitates the other? Furthermore, reliance on levels of economic freedom can produce misleading results. A measure of economic freedom at some point in time does not reveal how long that particular measure has existed. Nor is it possible to determine whether the extent of economic freedom has been increasing or decreasing. More revealing perhaps is the relationship between changes in economic freedom over time as subsequent income growth. This argument is further supported by the contention that there is often a time lag between any economic change and the resulting impact it may have. Therefore, it seems that any study designed to reveal the relationship between economic freedom and economic growth must be based on time-sensitive data.

James Gwartney holds the Gus A. Stavros Eminent Scholar Chair at Florida State University where he directs the Stavros Center for the Advancement of Free Enterprise and Economic Education. Working with others at the Fraser Institute in Vancouver, Canada, Gwartney has provided reliable information on measures of economic freedom for over 100 countries dating back to 1975 in the Economic Freedom of the World: Annual Report (hereafter, EFW) (Gwartney, et al., 2011). These data have made possible studies designed to measure the impact of the prevailing levels of economic freedom in these nations. The data are updated each year in annual reports and provide the base for this study.

Gwartney and those working with the EFW state that

individuals have economic freedom when (a) property they acquire without the use of force, fraud, or theft is protected from physical invasion by others and (b) they are free to use, exchange, or give their property to another as long as their actions do not violate the identical rights of others.

Further, they point out that the key ingredients of economic freedom are:

- personal choice
- voluntary exchange coordinated by markets
- freedom to enter and compete in markets, and
- protection of persons and their property from aggression by others

In essence, economic freedom is defined as the right of private individuals to use private property to engage in private commercial exchange without interference from central forces. Based on this description, EFW indices are developed as measures of the degree of economic freedom prevailing across the globe.

The EFW provides a wealth of data that serves as the foundation for many studies in this general field. The construction of the index is based on three important methodological principles. First, objective components are always chosen in preference to those that require value judgments. This minimizes bias and results in viable comparisons over time and across nations. Second, the data used to construct the index ratings are taken from external sources such as the International Monetary Fund, The World Bank and the World Economic Forum. Data provided internally within the nation under study are avoided only when international sources are not available. Finally, the EFW reports provided information as to how the data are collected, collated and parsed.
Table 1 THE AREAS, COMPONENTS, AND SUB-COMPONENTS OF THE EFW INDEX

1 Size of Government: Expenditures, Taxes, and Enterprises
   A General government consumption spending as a percentage of total consumption
   B Transfers and subsidies as a percentage of GDP
   C Government enterprises and investment
   D Top marginal tax rate: i Top marginal income tax rate
      ii Top marginal income and payroll tax rates

2 Legal Structure and Security of Property Rights
   A Judicial independence
   B Impartial courts
   C Protection of property rights
   D Military interference in rule of law and the political process
   E Integrity of the legal system
   G Regulatory restrictions on the sale of real property

3 Access to Sound Money
   A Money growth
   B Standard deviation of inflation
   C Inflation: Most recent year
   D Freedom to own foreign currency bank accounts

4 Freedom to Trade Internationally
   A Taxes on international trade: i Revenues from trade taxes (% of trade sector)
      ii Mean tariff rate
      iii Standard deviation of tariff rates
   B Regulatory trade barriers: i Non-tariff trade barriers
      ii Compliance cost of importing & exporting
   C Size of trade sector relative to expected
   D Black-market exchange rates
   E International capital market controls: i Foreign ownership / investment restrictions
      ii Capital controls

5 Regulation of Credit, Labor, and Business
   A Credit market regulations: i Ownership of banks
      ii Foreign bank competition
      iii Private sector credit
      iv Interest rate controls / negative real interest rates
   B Labor market regulations: i Hiring regulations and minimum wage
      ii Hiring and firing regulations
      iii Centralized collective bargaining
      iv Hours regulations
      v Mandated cost of worker dismissal
      vi Conscription
   C Business regulations: i Price controls
      ii Administrative requirements
      iii Bureaucracy costs
      iv Starting a business
      v Extra payments / bribes / favoritism
      vi Licensing restrictions
      vii Cost of tax compliance
Each annual report also clearly indicates the structure of the EFW index. The index measures the degree of economic freedom in five major areas. They are: 1) Size of Government: Expenditures, Taxes, Enterprises; 2) Legal Structure and Security of Property Rights; 3) Access to Sound Money; 4) Freedom to Trade Internationally and 5) Regulation of Credit, Labor, And Business.

Within the five major areas there are 23 components serving as index variables. The components are averaged, and the mean component ratings themselves are then averaged to derive an overall summary rating for each country. Using the criteria shown in Table 1, Gwartney, et al. ranked 141 countries on a scale of 0 to 10. The higher the ranking the greater the degree of freedom existing in that country. A more complete description can be obtained from the current annual report available free of charge from the website maintained by the Fraser Institute.

The specification used by Gwartney et al. (1999) can be expressed as

\[
\Delta Y_{1980,95} = \alpha + \sum_{i=1}^{k} \beta_i \Delta EF_{1,95}
\]

where \( Y \) is the natural logarithm of real GDP per capita as a measure of growth, \( EF \) is the measure of economic freedom for five-year intervals ranging from the first interval of 1975 to 1982 to the last interval, \( k \), ranging from 1990 to 1995.

While this methodology wisely relies on time series data, its purpose is not to determine directional causality. We are therefore still left with the question as to which variable might be Granger-causing the other. That is, which causes the other or are they jointly and endogenously determined?

2. Methodology and the Theoretical Structure:

While it is generally recognized that the statistical techniques of regression and correlation cannot identify cause-and-effect association, Granger (1969) has provided researchers with a most useful tool to distinguish suspected causal relationships. The distinction between Granger-causality and the causal factors in the more traditional sense must be kept in mind. Granger-causality simply notes the order of occurrence. It is based on the premise that if changes in one variable are repeatedly followed by changes in a second variable, the first variable may be Granger-causing changes in the second. The central focus is on whether lagged values of one variable can explain changes in a second variable. It can clearly be seen from this that timing is the critical issue. Undauntedly, Granger bravely provided a method to address the age old question, which came first, the chicken or the egg.

The Granger methodology tests the hypothesis that one time-series variable is useful in forecasting another. The null hypothesis that no causality exists can be rejected if it can be shown through a series of t-tests and F-tests that lagged values of one variable, \( X \), combined with the lagged values of a second variable, \( Y \), prove statistically significant. It is then concluded that \( X \) Granger-causes \( Y \).

To complete the Granger test two regression models must be estimated based on the premise that there prevails two time-series variables, \( X \) and \( Y \), and evidence is sought as to a potential causal relationship running directionally from \( X \) to \( Y \) and, alternatively from \( Y \) to \( X \). Assuming that we first want to test for \( X \)-to-\( Y \) causality, the first model
regresses the current value of Y on lagged values of itself. If there are to be j-lagged values of Y, the proper specification is expressed as

$$Y_t = \alpha_0 + \sum_{i=1}^{j} \beta_i Y_{t-i} + \varepsilon_t$$  \hspace{1cm} (2)$$

This specification excludes any reference to the other variable of interest, X. It is referred to as the restricted model in that the absence of the lagged X-values implies that the beta coefficients for X are restricted to zero and was played no role in the determination of current values of Y.

The second model incorporates lagged values of X in an explanatory role. It can be expressed as

$$Y_t = \lambda_0 + \sum_{i=1}^{j} \gamma_i Y_{t-i} + \sum_{i=1}^{m} \delta_i X_{t-i} + \nu_t$$  \hspace{1cm} (3)$$

This is referred to as the unrestricted model in that by including m lagged terms for X it is alleged that the coefficients of X, \( \delta_i \), are not zero, but offer additional information regarding changes in Y. In effect, the procedure tests whether, after controlling for the lagged values of Y, do the lagged values of X add significantly to the explanatory power of the model. It is not, by the way, uncommon to include control variables in both Equations (2) and (3).

The null hypothesis to be tested holds that the coefficients of X are indeed zero:

$$H_0: \delta_1 = \delta_2 = \ldots = \delta_k = 0$$

If the null is not rejected based on a partial F-test, it may be concluded that causality from X to Y does not prevail.

Of course, when with each model is estimated a sum of the squared errors, SSE, will be reported. There will occur a SSE\(_R\) for the restricted model and a SSE\(_U\) for the unrestricted model.

Each test for directionality is based on an F-test shown as

$$F_{test} = \frac{\frac{\text{SSE}_R - \text{SSE}_U}{m}}{\frac{\text{SSE}_U}{n-k}}$$  \hspace{1cm} (4)$$

where n is the number of observations in the unrestricted model (which may or may not be equal to the number of observations in the restricted model because of the potential for missing data), m is the number of lagged terms for the X-variable and k is the number of parameters to be estimated in the unrestricted model. Thus, m is the degrees of freedom for the numerator and n-k is the degrees of freedom for the denominator. The critical F-value is F\(_{\alpha, m, n-k}\).

A symmetrical procedure is then performed in which the X-values and Y-values are reversed as they appear in Equations (2) and (3). This tests for directional causality running from Y to X.
If two variables are being tested, X and Y, there are four possible outcomes. Causation may be unilateral from X to Y, it may be unilateral from Y to X, it may be bilateral (endogenous) or there may be no causality in either direction. A more complete discussion of the Granger test can be found in standard econometrics texts (see Webster Chapter 11, 2013).

Much of the earlier research relies on logarithms to capture the change in the selected measures of economic growth, call it X for the moment (see, as examples, Farr, et al., 1998; Paakkonen, 2010). This practice relies on the realization that

\[
\frac{d(lnX)}{dX} = \frac{1}{X}
\]  

(5)

and

\[
d\left(lnX\right) = \frac{dX}{X}
\]  

(6)

Therefore, given a small change in X, the change in ln X provides a measure of the relative or proportional change in X. If the change in X is quite small, the preceding relationship can be written as the change in ln X approximates the relative change in X. That is,

\[
\Delta(ln(X_{t+1}) - ln(X_t)) \approx \frac{X_{t+1} - X_t}{X_t}
\]  

(7)

However, this is indeed nothing more than an approximation of the change in X, and it cannot be over-emphasized that the change in X must be extremely small for the approximation to hold any validity. Given that small changes across time periods cannot be assured for all nations included in the study, it would seem that such a methodology is hazardous at best.

Furthermore, previous studies have concluded that the relevant issue is size or extent of changes in variable measurements and not their absolute levels (de Haan and Strum, 2000, 2001; Pitlik, 2002; Leertouwer, et al., 2002). To the extent that this is true the use of panel data is called for. Granger causality, of course, relies exclusively on such data.

The data used in this study to capture Granger causality covers the 10-year time period ranging from 2000 to 2009 for each of the nations included in the EFW database.

The models to be estimated are therefore

\[
GDP_{t,i} = Y_t = \alpha_0 + \sum_{j=1}^{f} \beta_j GDP_{t-j,i} + \sum_{j=1}^{f+j} \psi_j X(t-j-1, \delta) + \varepsilon_t
\]  

(8)

where GDP_{t,i} is the real GDP for each i\textsuperscript{th} nation for 2009 and GDP_{t-j,i} are the lagged values for GDP for the i\textsuperscript{th} nation for j = 9 previous time periods, and \(X_{t-j+1,i}\) is a vector of control variables, commonly used in related studies that are thought to influence economic growth.
where $EF_{t-j+1,i}$ are the measures for economic freedom for each $i^{th}$ nation for the 10 previous time periods. These models permit the test for directional causality from economic freedom to GDP. The inverse of each of these models is then estimated to test for reverse causality.

The original contributions provided by this paper include the use of purchasing power parity data over the time period in question. Given the wide disparities in levels of economic activity among the nations and the time span in question comparisons are not truly possible across nations unless some effort is made to ensure analogous data. Using values that have been subjected to purchasing power parity treatments should aid in this regard. Many of the papers found in the current literature fail to observe this condition.

In addition, use of the Granger methodology as applied to the panel data has not been widely employed in studies of this nature (see Aixala and Fabro, 2009). Doing so should provide insight not readily attainable from previous studies that fail to advantage themselves of more sophisticated econometric techniques.

The unique model specification should also add to the base knowledge surrounding this important concept. For example, the inclusion of the control variables which have been carefully selected will produce more accurate estimates for the model's coefficients.

Finally, the avoidance of log values will result in more precise measures for GDP and the indices for economic freedom. As noted above, the use of log-differences can only approximate the desired measures and then if and only if changes are extremely small.

3. Empirical Construct:

Previous research is clearly established a theoretical link between economic performance and economic liberty. Such evidence is emphatically provided by Gwartney and Lawson (2003) and Gwartney, Holcombe and Lawson (2006). Heckelman (2000) and Heckelman and Stroop (2000) provide further evidence of this relationship.

However, there seems to be a dearth of research devoted to a cross-comparison of nations based on wealth. Very little attention has been paid to the manner in which national wealth as measured by GDP affects the influence of economic freedom on economic growth. This section provides just such a comparison. The data are subdivided into quartiles based on the per capita 2000 GDP. The three quartiles are $Q_1 = 403$, $Q_2 = 1,816$ and $Q_3 = 9,526$. The four sub-categories to be analyzed are those nations with GDPs less than 403, those nations with GDPs between 403 and 1,816, those with GDPs between 1,816 and 9,526 and, finally, those with GDPs greater than 9,526.

As noted above, Gwartney, et al. (2011) provide measures of economic freedom for 141 countries. These are the values for EF used in the present study. GDP is expressed in constant U.S. dollars as per capita purchasing power parity. The data are taken from www.photius.com. As control variables, national poverty rates and the Gini coefficient were obtained from World Bank Research Center. The average education level for each nation included in the study was found at Nationmaster.com and used as an explanatory variable to account for the stock of human capital. Finally, measurements of foreign
direct investment are also accounted for as prescribed in earlier research (see Azman-Saini, et al. 2010).

**A Word On Choosing The Proper Number of Lags**

In applying the Granger causality tests an important issue focuses on the number of lags that should be used. Given the mechanics inherent in the regression process the number of lags chosen for the model can have a crucial impact on the outcome and the conclusions derived by the researcher. Almost all of the earlier research seems quite cavalier in its approach to lagged selection. In many cases this all-important decision is based on data availability and/or mere convenience. Model specification and its final selection are all too often determined on the basis of $R^2$ and adjusted $R^2$ after considerable trial and error. Such random and haphazard methodology leads to questionable results and is difficult to defend. It is easy to overfit the model due to the tendency to inflate the coefficient of determination and at the same time reduce both the standard error and the residual sum of squares. This practice will likely introduce multicollinearity into the model and thereby precipitate all the problems that it creates.

There are several prescribed methods best suited to determine the proper number of lags. Most notably among them is that developed by Akaike (1974) termed “an information criterion” or (AIC). It provides a means of model selection and relies on the concept of information entropy in that it measures how information within a given model is used to describe reality.

The AIC criterion is calculated as

\[
AIC = \frac{2k}{n} \sum_{i=1}^{n} \hat{e}_i^2 = \frac{2k}{n} SSR
\]  

(10)

or, alternatively,

\[
AIC = 2k - 2\ln[L]
\]  

(11)

where $k$ is the number of right-hand side variables including a constant term and $L$ is the maximized value of the likelihood function for the estimated model. Given a set of models under comparison, the desired model is the one with the minimum AIC. It can be seen from Equation (10) that as $k$ increases so does the expression $e^{2k/n}$. As an increasing function of the number of estimated parameters, it carries a higher penalty for overfitting than does the adjusted coefficient of determination. The AIC evaluates a model on the basis of how closely its fitted levels estimate the true levels of the regressand based on expected values. Many modern software packages allow the option to calculate the AIC. Based on this procedure, the decision was made to incorporate ten lagged terms.

**Does Economic Freedom Granger Cause Economic Growth?**

Based on the models specified above and relying on the methodology provided by Granger, estimations are provided that are designed to reflect the relationship between lagged values of economic freedom and economic growth. The intent is to determine the extent to which Granger-causality may exist between these two variables. Various models are estimated under a range of conditions. To begin with, bivariate models are
compiled comprised of only the two principal variables. Subsequently, the control variables cited above are added to the analysis. In each case, the intent is to determine if directional causality flows from economic freedom to economic growth. This requires that economic growth, as measured by changes in GDP over the time period 2000 to 2009, be used as the regressand. Let us first examine the bivariate models.

**Bivariate Results:**

To capture the pure effect of the interrelationship between economic freedom and economic growth, bivariate models that include only measures of GDP and economic freedom are estimated to the exclusion of all of the control variables cited above. The first model to be estimated is designed to test for Granger causality running from economic freedom to economic growth. That is, the intent is to test the hypothesis that economic freedom can serve as an economic stimulus. This requires that the restricted model be estimated in which 2009 GDP is regressed on its lagged values. The unrestricted model is then tested by including the indices for economic freedom provided by the Gwartney report. Based on a partial F-test, Equation (4) is then applied to determine if the prevailing scope of economic freedom adds significantly in the effort to explain GDP. This procedure is applied to five models – a model incorporating all 141 nations included in the Gwartney report and each subset defined by the quartiles. The resulting F-values and their associated p-values are shown in Table 2.

**Table 2 – Does Economic Freedom Granger Cause Economic Growth:**

<table>
<thead>
<tr>
<th>Panel A – Bivariate Results</th>
<th>Panel B – Multivariate Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All Observations</strong></td>
<td></td>
</tr>
<tr>
<td>n = 141</td>
<td></td>
</tr>
<tr>
<td>$F_{\alpha,10,121}$</td>
<td></td>
</tr>
<tr>
<td><strong>Quartile 1</strong></td>
<td></td>
</tr>
<tr>
<td>GDP* &lt; 403</td>
<td></td>
</tr>
<tr>
<td>n = 35</td>
<td></td>
</tr>
<tr>
<td>$F_{\alpha,10,16}$</td>
<td></td>
</tr>
<tr>
<td>F-value = 1.89</td>
<td></td>
</tr>
<tr>
<td>p-value = 0.051</td>
<td></td>
</tr>
<tr>
<td>F-value = 2.63</td>
<td></td>
</tr>
<tr>
<td>p-value = 0.041</td>
<td></td>
</tr>
<tr>
<td><strong>Quartile 2</strong></td>
<td></td>
</tr>
<tr>
<td>403 &lt; GDP* &lt; 1816</td>
<td></td>
</tr>
<tr>
<td>n = 35</td>
<td></td>
</tr>
<tr>
<td>$F_{\alpha,10,16}$</td>
<td></td>
</tr>
<tr>
<td>F-value = 1.69</td>
<td></td>
</tr>
<tr>
<td>p-value = 0.122</td>
<td></td>
</tr>
<tr>
<td><strong>Quartile 3</strong></td>
<td></td>
</tr>
<tr>
<td>1816 &lt; GDP* &lt; 9526</td>
<td></td>
</tr>
<tr>
<td>n = 36</td>
<td></td>
</tr>
<tr>
<td>$F_{\alpha,10,17}$</td>
<td></td>
</tr>
<tr>
<td>F-value = 2.18</td>
<td></td>
</tr>
<tr>
<td>p-value = 0.075</td>
<td></td>
</tr>
<tr>
<td><strong>Quartile 4</strong></td>
<td></td>
</tr>
<tr>
<td>GDP* &gt; 9526</td>
<td></td>
</tr>
<tr>
<td>n = 35</td>
<td></td>
</tr>
<tr>
<td>$F_{\alpha,10,16}$</td>
<td></td>
</tr>
<tr>
<td>F-value = 3.01</td>
<td></td>
</tr>
<tr>
<td>p-value = 0.022</td>
<td></td>
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</tbody>
</table>

| **All Observations**        |                                 |
| n = 141                     |                                 |
| $F_{\alpha,10,118}$         |                                 |
| **Quartile 1**              |                                 |
| GDP* < 403                  |                                 |
| n = 35                      |                                 |
| $F_{\alpha,10,12}$          |                                 |
| F-value = 1.96              |                                 |
| p-value = 0.044             |                                 |
| F-value = 3.15              |                                 |
| p-value = 0.032             |                                 |
| **Quartile 2**              |                                 |
| 403 < GDP* < 1816           |                                 |
| n = 35                      |                                 |
| $F_{\alpha,10,12}$          |                                 |
| F-value = 1.24              |                                 |
| p-value = 0.356             |                                 |
| **Quartile 3**              |                                 |
| 1816 < GDP* < 9526          |                                 |
| n = 36                      |                                 |
| $F_{\alpha,10,13}$          |                                 |
| F-value = 2.63              |                                 |
| p-value = 0.058             |                                 |
| **Quartile 4**              |                                 |
| GDP* > 9526                 |                                 |
| n = 35                      |                                 |
| $F_{\alpha,10,12}$          |                                 |
| F-value = 3.94              |                                 |
| p-value = 0.014             |                                 |

* Per Capita
Panel A of Table 2 reports the outcome of the bivariate test as to whether economic freedom Granger-causes economic growth. It can be seen that economic freedom is, in general, conducive to economic progress. As applied to the combined total of 141 nations the null hypothesis that economic freedom has no bearing on economic progress is rejected at the 5% level.

Of the four sub-categories based on quartiles, only the second quartile reports insignificant results. The poorest nations with a per capita GDP of less than $403 measured in U.S. currency find that economic freedom can be identified as a causal factor in economic growth. Lagged values for the economic freedom index serve as explanatory factors for measured levels of GDP. This same feature characterizes conditions found in the upper two quartiles. It is only in the second quartile that evidence of the relationship between lagged values for the freedom index do not add to the explanatory nature of the regression model. Yet, in total, we can reject the hypothesis that economic freedom does not Granger-cause economic growth based on these bivariate models.

These findings offer direction for governmental policies in those less-developed nations in their efforts to promote economic growth and development. It can firmly be concluded that economic liberalization is conducive to economic well-being. For that matter, the more developed nations can also rely on this relationship to promote further growth and reverse economic downturns.

**Multivariate Results:**

Given the danger of endogenous bias due to omitted variables, a multivariate test is performed by including standard control variables generally presented in the literature. Specifically, the four variables cited above – poverty levels, the Gini coefficients, education levels and direct foreign investment – are added to the test. These results are displayed in Panel B of Table 2.

Similar results are encountered. With only the exception of the second quartile it is clear that economic freedom precedes economic growth. In each case other than those nations located in the second quartile, all p-values indicate a high level of significance.

The conclusions and introspection provided by the bivariate tests can also be presumed here. That is, the extension of economic freedom to market participants can encourage economic growth and prosperity. All nations, whether developed for emerging, can provide economic benefits to their citizenry by lessening central government control over economic matters.

**Does Economic Growth Granger Cause Economic Freedom?**

This section addresses the issue as to whether economic expansion can Granger-cause changes in the level of economic freedom. The tests for Granger-causality running from GDP to economic freedom are less conclusive than were those discussed above. The results are a bit inconsistent leading to a more equivocal outcome. Again, we began with a discussion of the bivariate models.

**Bivariate Results:**

The results of the bivariate tests are presented in Panel A of Table 3. The directional test for the total of all 141 nations reports as significant at the 9% level. Surprisingly, all quartiles except for the highest reveal that economic growth does not
sem to promote heightened economic liberties. Only the richest nations seem to demonstrate that economic freedom is influenced by prosperity.

Table 3 – Does Economic Growth Granger Cause Economic Freedom:

<table>
<thead>
<tr>
<th>Panel A – Bivariate Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Observations n = 141</td>
</tr>
<tr>
<td>GDP* &lt; 403 F_{α,10,121}</td>
</tr>
<tr>
<td>Quartile 1</td>
</tr>
<tr>
<td>GDP* &lt; 403 F_{α,10,16}</td>
</tr>
<tr>
<td>n = 35</td>
</tr>
<tr>
<td>F-value = 1.69 p-value = 0.090</td>
</tr>
<tr>
<td>= 1.47 p-value = 0.237</td>
</tr>
<tr>
<td>Quartile 2</td>
</tr>
<tr>
<td>GDP* &lt; 403 F_{α,10,16}</td>
</tr>
<tr>
<td>1816 &lt; GDP* &lt; 9526</td>
</tr>
<tr>
<td>n = 36</td>
</tr>
<tr>
<td>F-value = 2.01 p-value = 0.103</td>
</tr>
<tr>
<td>= 1.12 p-value = 0.405</td>
</tr>
<tr>
<td>Quartile 3</td>
</tr>
<tr>
<td>GDP* &lt; 403 F_{α,10,16}</td>
</tr>
<tr>
<td>1816 &lt; GDP* &lt; 9526</td>
</tr>
<tr>
<td>n = 36</td>
</tr>
<tr>
<td>F-value = 1.12 p-value = 0.405</td>
</tr>
<tr>
<td>= 2.54 p-value = 0.047</td>
</tr>
<tr>
<td>Quartile 4</td>
</tr>
<tr>
<td>GDP* &gt; 9526 F_{α,10,16}</td>
</tr>
<tr>
<td>n = 35</td>
</tr>
<tr>
<td>F-value = 2.08 p-value = 0.087</td>
</tr>
<tr>
<td>= 2.08 p-value = 0.115</td>
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<td>* Per Capita</td>
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The failure to find causality in the three lower quartiles is an interesting and somewhat perplexing result. It prompts some level of introspection as to just why this is the case. Why do only the more wealthy nations report that economic freedom is Granger-caused by economic growth? This finding of non-causality from growth to economic freedom for lower income countries may be attributed to governmental structure. As Saribas (2010) points out, many of the less prosperous nations exit under less liberal regimes. A cursory survey of many countries across the globe appears to bear this out. This seems particularly true in many less-developed African nations. Nations such as Chad, Cote d'Ivoire and the Democratic Republic of Congo serve as examples. However, many nations in other parts of the world also fall into this unfortunate assemblage. Cardinal measures of political freedom are compiled by Freedom House, a U.S.-based non-governmental organization (NGO) that conducts research and advocacy on democracy, political freedom and human rights (Freedom in the World, 2012).

As such, these governments are less willing and less likely to relinquish any of their central control over any matters, including economic concerns, that currently prevails in those countries. This feature alone may account for the failure for economic growth to prompt more liberal economic climates.

These results seem to dispute those provided by Farr, et al. (1998) that concluded that economic well-being, as measured by GDP, tended to Granger-cause economic
freedom. This suggested a feedback effect providing evidence that economic freedom and economic well-being are endogenously determined. This contradictory result may have occurred because Farr, et al. bifurcated their data set into industrialized and non-industrialized nations.

**Multivariate Results:**

The multivariate tests found in Panel B of Table 3 are consistent with those results obtained from the bivariate analysis. The estimate based on all nations included in the Gwartney study produced significant results. We can conclude that in general economic expansion aids in the explanation of the degree or extent of economic freedom within the country. Again, only the results derived from the wealthiest nations in the upper quartile allow us to reject the null hypothesis that economic growth does not Granger-cause economic freedom.

This may again be explained, as noted above, by the fact that more intrusive governmental policies are associated with less-developed nations whose prevailing regimes are disinclined to relinquish any of their centralized control despite trends in economic prosperity. Further research into the character of political freedom within these nations is called for. In this manner it would be possible to test the inherent hypothesis posed here. This line of reasoning has been followed by others such as Krickhaus (2004). This particular area of research has been identified as the Hayek-Friedman hypothesis (see Lawson and Clark, 2010). It centers on the levels of economic freedom and political freedom prevailing in any given nation. It basically argues that a flourishing climate of economic freedom can coexist only under higher levels of political liberalism.

**4. Conclusion and Summary:**

This paper examines the relationship between economic freedom and economic growth. The former measure is provided by the work of Gwartney and others at the Fraser Institute. The latter is gauged by national GDP. Granger-causality methodology is employed to characterize the relationship.

The effort is first designed to determine if there is directional causality from economic freedom to economic growth. That is, it addresses the issue as to whether economic freedom precedes economic growth. The entire data set of 141 nations included in the Gwartney study are initially examined. It was clearly shown that a causal-factor was indeed present. It was apparent from the analysis that economic freedom did indeed precede economic growth. It can therefore be emphatically concluded that economic freedom does indeed Granger-cause economic growth.

The full data set was parsed into distinct quartiles based on 2000 GDP. Each quartile was then analyzed to detect causality. Only those nations in the third quartile with per capita GDPS between $1,816 U. S. and $9,526 U.S. failed to report significant Granger- causality. The other three quartiles all responded with statistically significant signs of distinct causality. In each of these cases it can be concluded that economic freedom does, in fact, precede expansion in national output. The null hypothesis that measures of economic freedom fail to add explanatory power to the model must be rejected. Almost universally, it can be stated that economic freedom as defined by the Gwartney analysis Granger-causes economic expansion.

A reciprocal analysis was then conducted to construct models intended to determine if economic growth might Granger-cause economic freedom. The purpose of
this approach was to ascertain the viability that economic growth might precede economic freedom. Here the results were far less conclusive. While the full data set of all 141 nations unequivocally revealed the existence of Granger-causality, the sub-divisions based on quartiles were less inclined to report directional causality. Only the upper quartile consisting of nations with per capita GDP in excess of $9,526 reported the presence of causality. In the three lower quartiles the standard partial F-test that forms the core of the Granger-causality methodology forced the conclusion that causality was absent. Economic growth did not precede economic freedom.

The question remains what conclusions might be drawn from this analysis about national policy concerning critical economic and legal issues. Apparently, by strengthening economic freedom as defined by the Gwartney analysis and shown in Table 1, it is possible to promote economic growth. Allowing increased levels of economic freedom can result in economic expansion. This general contention seems unequivocal for the general freedom index as used here, although different measures may show different effects. For example, Guisan (2012) noticed that freedom to trade may have a negative impact on the growth of real GNP per capita under specified conditions that result in general industrial decline.

As to any conjecture on the failure of economic growth to promote economic freedom, it might be concluded that certain less prosperous nations might enjoy a degree of economic growth. However, many of these less affluent nations are characteristically subjected to a less liberal form of government structure (Saribas, 2010). A greater degree of central control prevails throughout many poorer nations. Despite any economic progress these redistricting governments are disinclined to relinquish any of their (dictatorial) power that they have garnered over time. This conjecture is supported by the fact that economic growth pre-dated economic freedom in only the more prosperous, and it can be added, less restrictive regimes.

Much work remains to be done in this critical area. Given the threat of worldwide economic chaos and the threatened collapse of several national economies, any light that might be shed on precepts surrounding economic growth is extremely welcome.

References


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