

**Does Economic Freedom Determine Economic Growth?**  
**A Discussion of the Heritage Foundation's Index of Economic Freedom**

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## **ABSTRACT**

The purpose of this thesis is to examine the data and methodology used in constructing the Heritage Foundation's Index of Economic Freedom. The historical development of the index (1995 – 2012) and the trends in the movements of its freedom categories are analyzed in order to assess the quality of the index as an aggregate measurement of economic freedom. This study examines the significance of the index in economic research and its applications in growth literature. The index aggregation methodology is evaluated using principal component analysis and factor analysis in order to reduce and summarize the large number of variables included in the index to a few orthogonal constructs which explain as much of the variation in the original data as possible. Finally, Granger causality tests are applied to the index data and annual real GDP growth rates in order to explore the direction of causality between freedom and growth and identify the freedom categories which contribute to growth and the ones which deter growth.

The contribution of this thesis is twofold. First, the results of analyzing the factors and principal components of the Index of Economic Freedom indicate that economic freedom is not one dimensional and that attempts to aggregate many variables into a single summary index might result in misrepresentation of economic freedom. Second, it establishes that not all freedom categories contribute to growth. In particular, I find that Fiscal Freedom, Government Spending, and Monetary Freedom precede growth, whereas the remaining categories are either not related to growth or are jointly determined by a third factor, suggesting that not all economic freedom categories can be aggregated into a summary overall freedom index without distorting the relationship between economic freedom and prosperity.

**Keywords:** economic freedom, growth, aggregate indices, factor analysis, principal component analysis, Granger causality test

*На семейството ми*

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Since Adam Smith's *Inquiry into the Nature and Causes of the Wealth of Nations* (1776), economists have been trying to answer the question: Why are some countries more prosperous than others? Since 1956, the Solow growth model has been dominating the theory of economic growth. It looks at labor productivity, capital accumulation, population growth, and technological progress as an exogenous variable in order to explain long-term growth. However, Solow's model does not explain technological progress and in the 1980s growth theorists developed alternative models in which technological progress is endogenous. More recent endogenous growth models (Romer, 1986, 1990; Lucas, 1988) have pointed out other variables that contribute to differences in growth rates, such as knowledge spillovers, R&D, and human capital.

Yet exogenous and endogenous models were insufficient in explaining economic growth. Both approaches omit economic freedom as an important determinant of growth. Hence, a new line of research which emphasizes the importance of institutions and existing policies for economic growth has emerged. Measuring whether institutions create an environment conducive to economic

growth is a complex task which requires quantifying the quality of the institutional environment in a given country and its ability to promote and sustain economic freedom. The three most comprehensive studies that attempt to measure economic freedom are the Heritage Foundation's Index of Economic Freedom, the Fraser Institute's Economic Freedom of the World Index, and the Freedom House's Freedom in the World Index. This thesis presents a review of the Heritage Foundation's Index of Economic Freedom.

The Heritage Index, unlike the Fraser and the Freedom House indices, not only attempts to measure macroeconomic outcome variables for each individual country, such as inflation, tariff rates, government expenditure, etc. but it also qualitatively analyzes the ability of the institutions currently in place in each country to foster and sustain economic freedom. Due to this unique approach, the Heritage Foundation's index is heavily dependent on the research conducted by the Heritage Foundation experts and their analysis of the institutional environment in each country represented in the index. Hence, this index aggregation methodology poses two potential problems. First, aggregating an overall summary index consisting of more than 50 variables might not capture adequately the economic freedom level in the countries represented in the index. Additionally, the index score calculation methodology could be subject to the subjective interpretation of the existing policies in each country by the Heritage Foundation's economic policy experts. Second, the outlined measurement methodology specifications might impact any growth regressions which analyze

whether economic freedom, as measured by the Heritage index, determines economic growth. Addressing these two questions, as outlined in the following subsection, is the main research goal of the current study.

## **1.2 Research Objectives**

The purpose of this thesis is to examine the measurement methodology of the Index of Economic Freedom and analyze whether the index offers an adequate measurement of economic freedom. To test the measurement methodology of the index, I will use two multivariate statistical methods – factor analysis and principal component analysis – to extract a few orthogonal constructs, called factors, which explain as much of the variance in the index data as possible. Then, I will compare my findings with the index itself and draw conclusions regarding the usefulness of the index as an aggregate measurement of economic freedom.

Furthermore, after evaluating the index aggregation methodology, this thesis aims to analyze whether economic freedom, as measured by the Heritage Index, determines economic growth. By employing Granger-causality tests on lagged values of annual real GDP rates from the *World Economic Outlook* and annual economic freedom scores from the Heritage index for a sample of 91 countries, I test the hypothesis that economic freedom precedes growth in a temporal sense. Finally, I conduct Granger-causality tests using the ten freedom categories which comprise the Heritage index to analyze which economic freedoms determine economic growth and which freedoms deter growth. The

purpose of this analysis is to determine whether an increase in economic freedom would lead to increased prosperity in the long run and to assist policy-makers by identifying those freedom categories that determine economic growth and that need to become areas of concentration for future reform.

### **1.3 Thesis Organization**

The rest of this thesis is organized as follows. Chapter 2 provides a detailed overview of the index measurement methodology and the ten freedom categories comprising the index. Chapter 3 describes the use of the index in economic research. Chapter 4 describes the factor and principal component analyses of the index and discusses the results of these methods. Chapter 5 analyzes the direction of causality between economic freedom and economic growth and provides a discussion of the findings. Chapter 6 concludes with a summary of results and some concluding remarks.

## **CHAPTER 2**

### **OVERVIEW OF THE HERITAGE INDEX OF ECONOMIC FREEDOM**

#### **2.1 Index Methodology**

The Index of Economic Freedom is a project established by the Heritage Foundation and The Wall Street Journal that aims to provide a reliable measure of economic freedom for every economy in the world. The Heritage Foundation is a prominent conservative think tank based in Washington D.C., which was established in 1973 and aims to promote policies based on the principles of free enterprise and limited government intervention in the economy. The index was created in 1995 based on ten freedom categories that determine the overall economic freedom score for each country. The categories that the index is based on are business freedom, trade freedom, fiscal freedom, government spending, monetary freedom, investment freedom, financial freedom, property rights, freedom from corruption, and labor freedom. Each of the ten categories is composed of additional quantifiable measures, such as inflation, GDP, tariff rate, etc. and is given an annual score from 0 to 100. The ten scores are then equally weighted and averaged in order to obtain the overall economic freedom score of each country.

By giving each freedom category an equal weight, the index avoids any potential bias towards any of the constituent categories. However, the index does not examine the interaction between the ten different categories and does not analyze any potential correlation between any of the categories. The authors of the index have emphasized that defining such interactions and their potential impact on the index is not easily definable and is outside the scope of their study. They have explicitly stated that questions regarding minimum thresholds for some categories, dependence of the categories on one another, and determinants of economic growth are not analyzed by the index but could potentially pose valid concerns. This unexplored aspect of the index provides fruitful grounds for further exploration and analysis and could potentially reveal important relationships between the ten freedom categories.

## **2.2 Economic Freedom Categories: Description**

Depending on whether or not the freedom categories are composed based on mathematical formulas, they could be divided into two groups for the purposes of our discussion – objective and subjective categories. The first group of categories, i.e. the objective freedom categories, consists of business freedom, labor freedom, fiscal freedom, government spending, freedom from corruption, monetary freedom, and trade freedom. These seven categories are all measured using a quantitative measurement approach based on formulas, which are consistent for every country and thus provide an objective score that could be

decomposed into the initial variables used in the score equation. The first five of the objective categories – business freedom, labor freedom, fiscal freedom, government spending, and freedom from corruption – are entirely based on specific formulas, which evaluate each country’s score. In contrast, the last two categories, i.e. monetary and trade freedom, utilize a somewhat subjective penalty system in addition to a quantitative score formula. The penalty scores range from 0 to 20 points and are subtracted from the overall score achieved by every individual country based on the formula in the respective category. Thus, for instance, a country with a trade score of 80 which, according to the Heritage Foundation’s researchers, has significant non-tariff trade barriers might get up to 20 penalty points subtracted from its core score, yielding a trade freedom score of 60. The qualitative aspect of the penalty scores is an important factor in measuring the freedom scores and in understanding how the Heritage Foundation’s index functions.

The second major set of categories is the subjective categories group, which consists of investment freedom, financial freedom, and property rights. This set of categories is distinctively qualitative in its nature. All three categories are measured based on a scale from 0 to 100 where 0 represents the lowest possible freedom score in the respective freedom category and 100 represents the highest score that could be achieved. Each country’s score is evaluated depending on a rather subjective methodology used by the Heritage Foundation’s staff and thus could not be replicated. The next section presents a brief outline of each of

the ten freedom categories as well as the variables and the analytical framework used for building the index.

### 2.2.1 *Objective Freedom Categories*

#### Business Freedom

Business freedom is a category that evaluates the ability to start, operate, and close a business in the country being examined. The score constitutes of 10 subcategories and aims to analyze the efficiency of government regulation. The ten subcategories that constitute business freedom are number of procedures necessary to start a business, days required to start a business, cost of opening a business as a percentage of income per capita, minimum capital necessary to start a business as percentage of income per capita, number of procedures required to obtain a license, days required to obtain a license, cost of obtaining a license as a percentage of income per capita, number of years it takes to close a business, cost of closing a business as a percentage of the estate value, and recovery rate after closing a business (cents per dollar). The data for each of these categories is compiled primarily from the World Bank's Doing Business study but other additional sources are used as well to fill out missing data. Then each of the ten factors is converted into a score from 0 to 100 using the following conversion formula:

$$\text{Factor Score}_i = 50 \times \text{Factor}_{\text{average}} / \text{Factor}_i$$



Each factor's score depends on the ratio between the country's result for that particular factor relative to the world average, multiplied by 50. Finally, the overall business freedom score is obtained by averaging all ten factors' scores.

### Labor Freedom

Similar to the business freedom category, labor freedom offers a quantitative review of the legal and regulatory framework of a country's labor market. It takes into account six quantitative factors, with each factor counted as one-sixth of the labor freedom component. These factors are the ratio of minimum wage to the average value added per worker, hindrance to hiring additional workers, rigidity of hours, difficulty of firing redundant workers, legally mandated notice period, and mandatory severance pay.

In order to construct the labor freedom score, each of the abovementioned factors is converted to a scale of 0 to 100 using the equation below:

$$\text{Factor Score}_i = 50 \text{ Factor}_{\text{average}} / \text{Factor}_i$$

where the country  $i$  score is calculated relative to the world average and then multiplied by 50. This methodology is similar to the one used for the business freedom score and provides a very quantitative measure of the labor freedom score.

### Fiscal Freedom

Fiscal freedom attempts to measure the tax burden imposed by the government and consists of three quantitative factors: the top tax rate on individual income, the top tax rate on corporate income, and the total tax revenue as a percentage of GDP. Each of the three factors is weighted equally as one third of the total fiscal freedom score. In order to show the negative correlation between revenue returns and high tax rates, the creators of the index have used a quadratic cost function to evaluate the fiscal freedom score:

$$\text{Fiscal Freedom}_{ij} = 100 - \alpha (\text{Factor}_{ij})^2, \text{ where } \alpha=0.03$$

$\text{Fiscal Freedom}_{ij}$  stands for the fiscal freedom of country  $i$  for factor  $j$  and  $\text{Factor}_{ij}$  represents the value of factor  $j$  in country  $i$ .

### Government Spending

The government spending score aims to evaluate the level of government spending as a percentage of GDP. Although the authors of the index have not defined what the ideal levels of government spending should be in order to get a high score, they have established a methodology that treats zero government spending as a benchmark and penalized countries with a government spending rate of more than 30% of GDP. Hence, some developing countries that have little spending capacity may receive unreasonably high scores. However, the index assumes that this potential bias towards developing countries will be corrected by a lower score on other freedom categories. This assumption, although reasonable,

could skew the results because it does not provide a mechanism that ensures the developing countries get penalized in other categories if they get an artificially high government spending score.

The government expenditure equation used to measure the score is non-linear, similar to other categories, in order to ensure that countries with little government spending get penalized lightly whereas countries with government spending exceeding 30% of GDP get penalized significantly. The authors have also decided to use  $\alpha$  as a coefficient to control for variation among the scores. The equation they have used is:

$$GE_i = 100 - \alpha (\text{Expenditures}_i)^2$$

where  $GE_i$  represents the government expenditure score in country  $i$ ;  $\text{Expenditures}_i$  represents the total amount of government spending at all levels as a percentage of GDP; and  $\alpha$  is the control coefficient, which is set to 0.03. It is important to note that the government expenditure data includes spending at all government levels (federal, state, local) or central government expenditures, if other data is not provided.

### Freedom from Corruption

Freedom from corruption is a category that tracks the existence and extent of corruption and its impact on economic freedom. Corruption not only introduces insecurity into economic and business relationships, but it also has long-term consequences on the welfare of the citizens. The freedom from corruption

category is based off of the Transparency International's Corruption Perceptions Index (CPI). The CPI is structured on a 10-point scale where a score of 10 indicates very little corruption and a score of 0 reflects a very corrupt government. In order to obtain the freedom from corruption score, the CPI score for each country is multiplied by 10 to fit the index's scale. Thus, a country with a CPI score of 7.0 will receive a freedom from corruption score of 70.

### Monetary Freedom

The monetary freedom score gives an assessment of price stability and the price control measures that are necessary to maintain it. In order to obtain a score for this category, the authors have used the weighted average inflation rate for country  $i$  the last three years and a qualitative measure of price controls, which is subtracted from the monetary freedom score as a penalty. The penalty score could range from 0 to 20 points depending on the extent of price controls and is subtracted from the base monetary freedom score, which is calculated by the following formulas:

$$\text{Weighted Average Inflation}_i = \theta_1 \text{Inflation}_{it} + \theta_2 \text{Inflation}_{it-1} + \theta_3 \text{Inflation}_{it-2}$$

$$\text{Monetary Freedom}_i = 100 - \alpha \sqrt{\text{Weighted Average Inflation}_i} - \text{PC penalty}_i$$

where  $\theta_1=0.665$ ,  $\theta_2=0.245$ , and  $\theta_3=0.090$  are three numbers that sum to 1 and are exponentially smaller in order to account for the relatively higher significance of the most recent inflation rates;  $\text{Inflation}_{it}$  is the annual inflation rate in country  $i$  during year  $t$  according to the consumer price index;  $\alpha = 6.333$  is the coefficient

stabilizing the variance of the scores (e.g. a 10% inflation rate converts to a monetary freedom score of 80.0 when  $\alpha = 6.333$  and 2% inflation rate converts into a score of 91.0); PC penalty<sub>*i*</sub> is the price control penalty, which ranges from 0 to 20. The authors have decided to use the square root functional form for the weighted average inflation for more precision.

### Trade Freedom

Trade freedom as a category reflects the effect of tariffs and non-tariff barriers on the country's imports and exports. Therefore, the score is based not only on the trade-weighted average tariff rate but also on non-tariff barriers (NTB), which are deducted from the score as penalty points. Since different imports have different tariffs, the weighted average tariff uses weights for each tariff rate based on the share of imports that each particular good represents. Thus, the weighted average tariff rate is calculated using the following formula:

$$\text{Trade Freedom}_i = (((\text{Tariff}_{\max} - \text{Tariff}_i) / (\text{Tariff}_{\max} - \text{Tariff}_{\min})) * 100) - \text{NTB}_i$$

Trade Freedom<sub>*i*</sub> represents the trade freedom score in country *i* and according to the formula above this score depends on the weighted average tariff rate (Tariff<sub>*i*</sub>), and the upper and lower bounds for tariff rates (Tariff<sub>max</sub>–Tariff<sub>min</sub>). The NTB penalty is then subtracted from the score. The penalty could be 5, 10, 15, or 20 points according to the frequency of tariff use with 20 being the penalty for extensive use of tariffs that impedes international trade. The penalty size depends on both qualitative and quantitative data on the trade restrictions that the country

imposes. Some of the most common trade restrictions include quantity, price, regulatory, investment, and customs restrictions as well as direct government intervention.

### *2.2.2 Subjective Freedom Categories*

#### Investment Freedom

The investment freedom score calculated by the Index of Economic Freedom offers a qualitative approach to estimating the constraints on the flow of domestic and foreign investment capital. The authors of the index assume that an ideal score of 100 would be awarded to a country that imposes no restrictions to both foreign and domestic investors and provides access to foreign exchange, capital transfers, and payments. From this ideal score, the authors then subtract up to 25 penalty points for each investment restriction depending on the severity of the restrictions imposed by country's government.

The most common areas of restrictions considered in the index are national treatment of foreign investment, foreign investment code, restrictions on land ownership, sectoral investment restrictions, expropriation of investments without fair compensation, foreign exchange controls, and capital controls. In addition to that, up to 20 additional penalty points could be subtracted for security problems, underdeveloped national infrastructure, corruption, and other policies that hinder investment practices. While the abovementioned problems could certainly impede the flow of capital, their measurement is not easily definable and

is therefore relies heavily on the methodology and judgment of the index authors. Finally, in case a certain country's score becomes negative because more than 100 penalty points have been subtracted from the ideal score, then its investment freedom score is set at zero.

### Financial Freedom

The financial freedom category measures the efficiency and independence of the financial sectors of countries based on five categories: the extent of government regulation of financial services, the degree of state intervention in the financial sector through direct and indirect ownership, the extent of financial and capital market development, the government influence on the allocation of credit, and the openness to foreign competition. Ideally, a country's financial sector would be almost completely independent from the government and would provide a variety of financial services priced depending on the market conditions. Similar to the investment freedom category, the financial freedom category also uses the top-down approach. A score of 100 reflects an independent financial sector with minimum government influence. Then, depending on the dependence of its financial sector on the government, each country moves down the scale by 10 points. The minimum score that a country could get is zero and it reflects a repressive government whose financial policies are designed to prevent or completely prohibit private financial institutions.

## Property Rights

Property rights is the last category that is evaluated using the ideal score method. It aims to assess the extent to which the country's laws protect private property and the degree to which these laws are effectively enforced by the judiciary and the government. In that respect, the category also reflects the independence of the judiciary, the existence of corruption, and the likelihood of expropriation of private property. Each country is given a score on a scale from 0 to 100 where 100 reflects a country where private property is guaranteed by the government and a score of 0 reflects a country where all property belongs to the state.

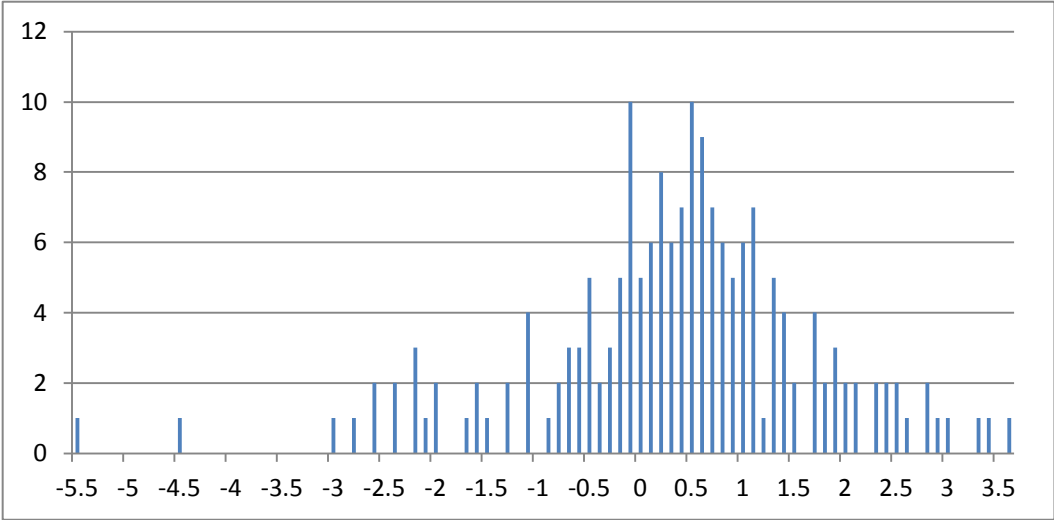
### **2.3 Data Description: 2012 Index of Economic Freedom**

Looking at the 2012 Heritage Economic Freedom Index data, which presents the state of economic freedom around the world in 2011, we can see that the assigned overall freedom scores vary significantly. For 2012, the minimum overall score is 1.0 and is assigned to North Korea, whereas the maximum freedom score is 89.9, which is awarded to Hong Kong. The average overall freedom score is 59.5 and this score represents only a slight improvement of 0.1 points from the 2011 score, indicating that economic freedom in the world has stayed stable and has not improved significantly in the last 12 months. While the overall score has not changed drastically, the individual countries' scores have fluctuated in comparison to the scores in 2011. The overall score year-over-year



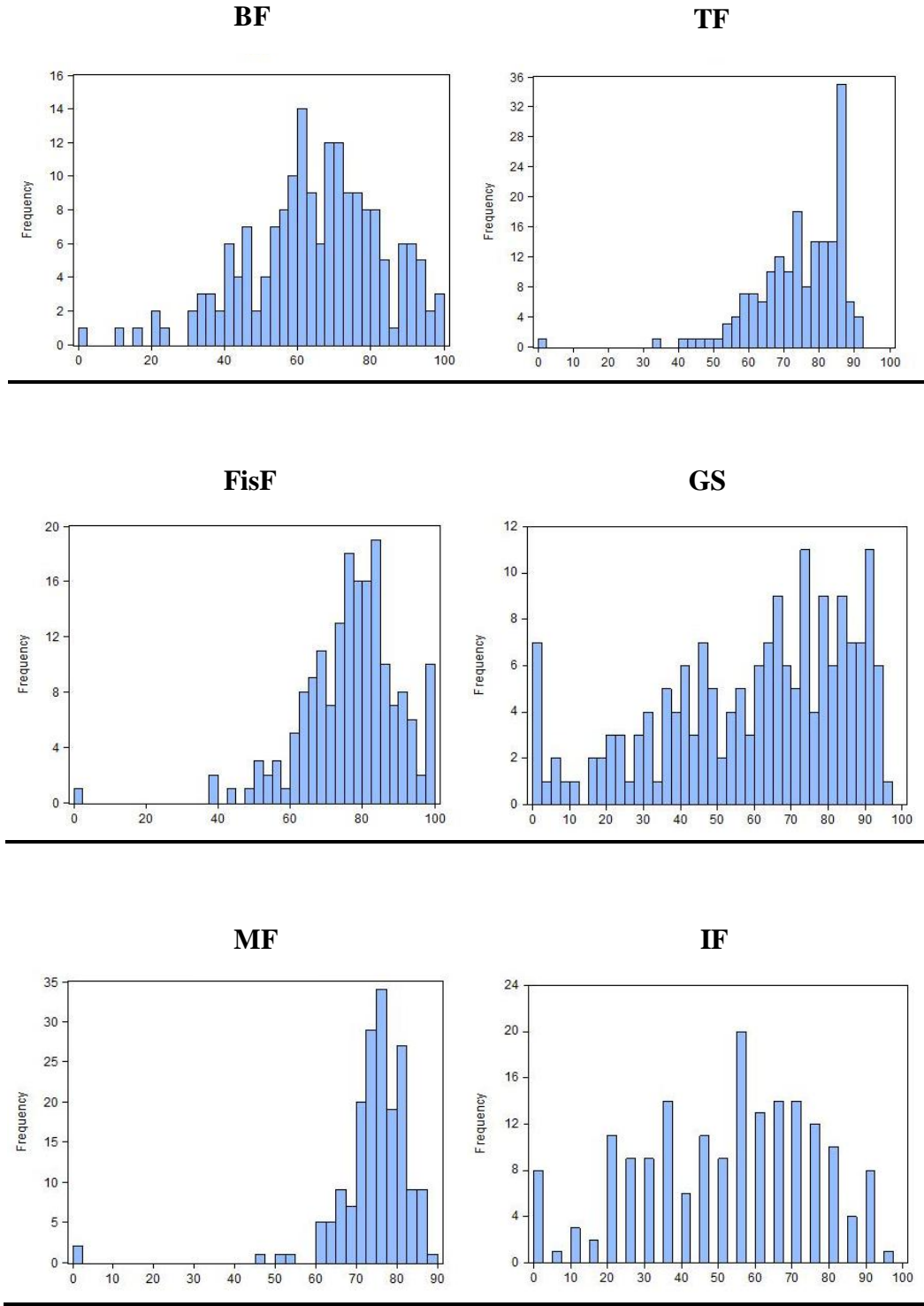
change ranges from -5.5 points to 3.6 points. Figure 1 represents the frequency of the year-over-year changes for all the countries in 2012. As indicated by Figure 1, most of the countries have not experienced significant shifts in economic freedom scores.

**Figure 1**  
**Yearly Overall Score Change Frequency (2012 Index)**

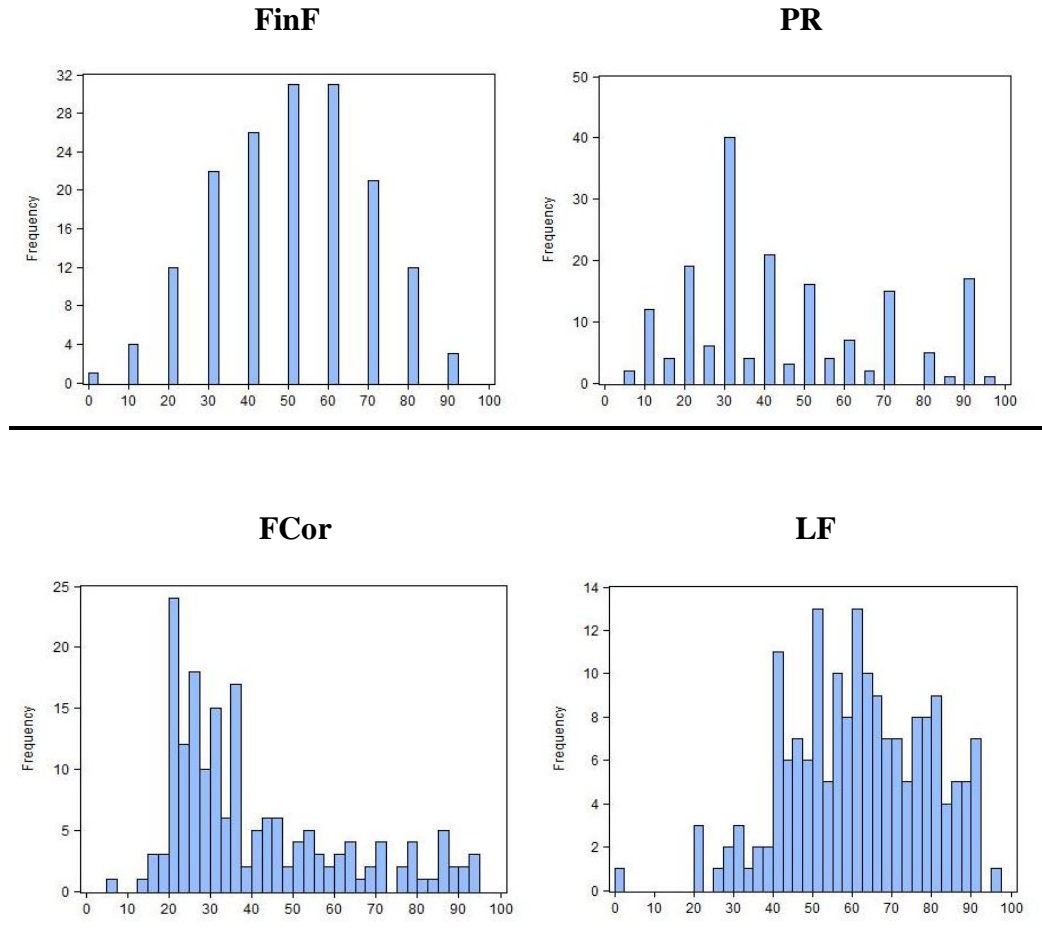


Similarly, the average scores of the individual freedom categories have not fluctuated drastically, as suggested by the histograms presented in Figure 2.

**Figure 2**  
**Histogram of the 10 Freedom Categories (2012 Index)**



**Figure 2**  
**Histogram of the 10 Freedom Categories (2012 Index) (Continued)**



Legend: BF=Business Freedom, TF=Trade Freedom, FisF=Fiscal Freedom, GS=Gov. Spending, MF=Monetary Freedom, IF=Investment Freedom, FinF=Financial Freedom, PR=Property Rights, FCor=Freedom from Corruption, LF=Labour Freedom

## **CHAPTER 3**

### **USE OF THE INDEX IN ECONOMIC RESEARCH**

#### **3.1 Overview**

Data from the Heritage Foundation's index of economic freedom has been used widely in economic research in a variety of fields. The most common application of the index can be found in index comparative studies which analyze the adequacy of economic freedom indices for measuring economic freedom and predicting economic growth. Several studies have compared and contrasted the two most important indices of economic freedom – the Heritage Foundation's index and Fraser Institute's index – in an effort to find a comprehensive quantitative measurement of economic freedom. In addition to index comparisons, regional comparative analyses have been done with the index data to gain a better understanding of the level of freedom of target groups of countries, such as the transition economies in Eastern Europe, Islamic countries, and Latin American countries.

Apart from comparative studies, the index of economic freedom has also been applied to research in entrepreneurship motivation, trade dynamics, human rights, and foreign aid. The countries' economic freedom scores and their respective ten freedom category scores have been widely used in regression analysis as variables indicating level of institutional development and independence from government intervention. Finally, it is important to note that

not only the index data but also the qualitative evaluation of the countries' performances have motivated researchers to analyze changes in economic freedom caused by policy reforms.

### **3.2 Index Comparison Studies**

In his paper on the problems associated with creating indices of economic freedom, Kešeljević (2007) elaborates on the importance of the institutional dimension of economic freedom for economic performance. He argues that an adequate institutional framework built on well-enforced property rights, sound legal system, and competition is essential for development and growth. Building off of his definition of economic freedom, Kešeljević gives a brief overview of the three major economic freedom indices and evaluates critically several studies which prove that economic freedom has a positive effect on economic growth.

Kešeljević (2007) investigates the importance of economic freedom for the economic performance of 24 transition economies by running a panel analysis on a dataset spanning from 1995 to 2004. The study provides further evidence that there is a relationship between economic freedom, economic performance, and prosperity even in transition countries. Interestingly, when conducted with data from the Heritage Foundation's index, the analysis yielded a stronger relationship than the study conducted using Fraser Institute's index.

Despite the theoretical and empirical proof for positive effect of economic freedom on growth and well-being, Kešeljević also argues that some studies have

found this effect to be insignificant. According to Kešeljević there are four reasons for that: subjectivity, lack of consistent division, problem of choice, and problem of aggregation (Kešeljević, 2007). All three indices are inherently prone to deficiencies because of their measurement techniques. First, all of the indices measure freedom as an objective category (e.g. based on property rights, laws, trade barriers, etc.) and ignore the different countries' perceptions of economic freedom as a whole, which depend on culture, education, political system, etc. In addition to that, freedom is only considered as individual freedom and not on a collective basis. For instance, both the Fraser Institute's index and the Heritage Foundation's index consider tax rates as an important economic freedom factor. However, neither of the two indices differentiates between a country that has reached a consensus on a higher tax rate and a country that has not. Furthermore, countries' freedom scores are significantly affected by the choice of categories that are included in the different indices as well as their specific interpretations. A country might get a very high score on one of the indices and a comparatively low score on another due to differences in the freedom category constituents or their interpretation by the creators of the indices. Finally, the major deficiency of the three indices is that they are composite indices consisting of sub-indices that have their own structure and weight within the broader composite index. The Heritage Foundation, for instance, has ten categories and each of them is weighted equally to form the final economic freedom score. The Freedom House index is built in a similar way as well but the Fraser Institute's Economic Freedom of the World

Index assigns different weights to the different categories. These specific weights have also been changing since the index was first published, thus adding additional subjectivity to the index building technique that has been used.

### **3.3 Regional Comparative Studies**

Apart from being used in the numerous studies that compare the different economic freedom indices, data from the Index of Economic Freedom has also been used to compare different geographic regions and their level of economic freedom. In a comparative study, Peláez (2008) examines economic freedom in five different subsets of countries: free (used as a benchmark for the other four groups), mostly free, Islamic, Latin American, and EU members with scores below “mostly free.” By using the mean scores of the countries in these five groups, Peláez runs a cross-section least squares regression model which estimates the statistical significance of the differences in the groups’ means.

Peláez uses the 2007 Index of Economic Freedom data for the regression model and finds that Islamic countries are less free than the benchmark countries in eight out of the ten categories: property rights, freedom from corruption, investment freedom, business freedom, financial freedom, trade freedom, labor freedom, and monetary freedom. Similarly, the Latin American countries are less free than the benchmark countries in all categories except for fiscal freedom and government spending. The EU members with score less than “mostly free” are less free than the benchmark in property rights, freedom from corruption,

investment freedom, business freedom, financial freedom, labor freedom, and monetary freedom. Finally, Peláez analyzes the level of difference in means between EU countries with score less than “mostly free,” Latin American countries, and Islamic countries and concludes that although they share the same failings, they are less economically free than the benchmark countries to a different degree. The EU countries which scored below “mostly free” are more economically free than the Latin American countries, which in turn are freer than Islamic countries.

Another study that has also used a similar regional comparison approach analyzes the level of European integration of an EU candidate – Croatia. In their paper on Croatia’s institutional convergence to the EU, Baletić et al. (2007) simultaneously use data from the Heritage Foundation’s Index of Economic Freedom and the Economic Freedom of the World Index to examine Croatia’s scores over time and in comparison to other EU countries. The authors find that although both indices measure economic freedom, Croatia’s scores differ significantly. Therefore, Baletić et al. conclude that both indices should be used with caution both by researchers and by investors interested in understanding the level of Croatia’s institutional quality and convergence to the EU standards.

The importance of economic progress and thus, of economic freedom, has also been emphasized by two studies on the transition economies in the European Union. Warner (2002) examined the progress of 12 European transition countries that would either join the EU in 2004 or are in negotiations with the EU (called



TC-12), using the current EU-15 member states as a benchmark. Engle (2006) conducted the same research and added an economic freedom dimension to this comparative study. The relationship between the Index of Economic Freedom and GDP per capita is compared for the target group and the benchmark group in order to analyze whether the transitional economies have been progressing at an adequate pace which would enable them to reach 90% of the average GDP per capita growth of the EU-15 countries within approximately one generation.

The TC-12 countries in the study include the eight countries that joined the EU in 2004 (Latvia, Estonia, Lithuania, Poland, Czech Republic, Slovak Republic, Hungary, and Slovenia) as well as the four countries that were in membership talks at that time (Bulgaria, Romania, Croatia, and Turkey). Engle finds that between 2000 and 2004, the average growth rate of the TC-12 countries was outperforming the average growth rate of the EU-15 members by approximately 3.5%. In addition to that, he also finds that the overall economic freedom score difference between the benchmark group and the TC-12 countries decreased from 0.83 in 1996 (Warner, 2002) to 0.45 in 2006. The overall economic freedom score difference between the benchmark group and the TC-12 countries decreased from 0.83 in 1996 (Warner, 2002) to 0.45 in 2006 (Engle, 2006). Most importantly, this study confirmed that all TC-12 countries will reach 90% of the EU-15 average GDP per capita within one generation, assuming that they keep up with their then growth rates.

Finally, Eagle (2006) delves deeper into the correlation between the countries' economic freedom scores and GDP per capita and finds a correlation of 0.73 significant at the 5%. The four major components of the index that seem to have contributed the most for this correlation are Monetary Freedom, Labor Freedom, Property Rights, and Freedom from Corruption. In contrast, Fiscal Freedom, Monetary Freedom, and Financial Freedom are more important for GDP growth rates alone. When analyzing GDP per capita change over the period from 1995 to 2004 versus countries' overall economic freedom scores in 2005, the data suggest that the countries that have increased their GDP per capita the most over that period have the highest economic freedom scores in 2005. Overall, this study is a very good example of the importance and usefulness of the Heritage Foundation's Index of Economic Freedom for running regression analysis with a large number of countries over more than 10 years. In that respect, the data from the index have significantly improved the previous results found by Warner in 2002, which used the more limited Global Competitiveness Index.

### **3.4 Entrepreneurship**

Entrepreneurial motivation and its dependence on a country's institutional environment as measured by the Index of Economic Freedom is another important research topic where data from the index has been used. Two studies have used Heritage Foundation's index to evaluate the effect of institutional corruption on entrepreneurs and the effects of economic freedom on the motivation to engage in

entrepreneurial activities, respectively. In the first study, Gius (2006) finds that counter-intuitively, corrupt societies actually encourage entrepreneurial activity while economic freedom encourages business ownership. This study uses a unique approach because it separates entrepreneurial activities from business ownership and examines their correlation with both a corruption and an economic freedom index. This separation allows the author to find out that younger people are more likely to become entrepreneurs whereas older people are more often business owners. The entrepreneurship analysis shows no statistically significant correlation between levels of entrepreneurial activity and economic freedom. However, the business ownership regression identifies a negative statistically significant at the 10% significance level correlation between economic freedom and business ownership. Therefore, the author has concluded that societies which are less economically free tend to have large state-owned or state-supported corporations. Additionally, the owners of businesses in those societies are typically older, male, and holders of graduate degrees.

The second study on entrepreneurship also differentiates between two categories – opportunity-motivated entrepreneurial activity (OME) and necessity-motivated entrepreneurial activity (NME) – which are both regressed on the 10 factors of economic freedom of the Heritage Foundation. According to McMullen et al. (2008), OME is the conscious decision to start a business as a choice among many other career options. Thus, OME is not a forced decision but rather an attractive option that individuals choose to pursue because of their own desire and

interest. NME, in contrast, is the decision to start a business because of the lack of other options. Individuals who become entrepreneurs out of necessity are forced to do so because this opportunity is their last resort. Due to these differences in motivation, the authors are also able to observe different results for the two groups of entrepreneurs. For instance, OME is found to be positively correlated with Property Rights while NME is positively correlated with Fiscal Freedom and Monetary Freedom. These results show that government restrictions to economic freedom can impact entrepreneurs in a different way, depending on their motives to engage in entrepreneurial activities. These differences are due to the different profit margins associated with OME versus NME. Since OME is conscious choice, it is often more innovative and less sensitive to changes in transaction costs while NME tends to be more sensitive to transaction costs.

### **3.5 Human Rights and Foreign Aid**

Foreign aid as an important stimulus for growth is another branch of development economics where the Index of Economic Freedom data has been utilized successfully. Knedlik et al. (2006) analyze whether foreign aid affects economic freedom by using data from the Heritage Foundation's Index of Economic Freedom as a dependent variable and data for official development assistance funds as well as conditional aid from international foreign aid organizations, such as the IMF, as independent variables. The debate around the relationship between economic freedom and foreign aid is part of a broader

discussion concerning the importance of economic freedom as a prerequisite for economic development. The authors of the paper claim that economic freedom has a positive correlation with economic growth and hypothesize that to promote economic growth, foreign aid should either have a positive correlation with economic growth or should at least not affect it negatively. Similar studies on foreign aid conducted by Djankov et al. (2005) have compared the impact of direct foreign aid to the recipient countries to the effect of abundant natural resources, also known as the “natural resources curse.”

The goal of Knedlik et al. is to examine whether a negative correlation exists by running a panel data analysis on both unconditional (World Bank data for average aid per capita) and conditional (IMF credit) foreign aid and identifying the effect of aid on the countries’ economic freedom scores. Conditional aid is described as an aid package that requires certain reforms to be met as pre-conditions for receiving the aid. As a result of implementing those requirements to the recipient countries, donors are hypothetically ensuring that there will be a positive effect on growth because the funds are going to be used to enhance public investments and thus lead to increased private cash flows. However, a second theory claims that those conditions are obsolete and do not get enforced by the aid recipients. The most recent studies on foreign aid and economic growth conclude that foreign aid leads to increased growth only when the recipient country has favorable conditions, which are essentially the conditions prevalent in economically free societies. Hence, Knedlik et al. examine

the relationship of both unconditional and conditional foreign aid sources on economic freedom as a characteristic of a favorable environment in the recipient countries. Despite the fact that previous studies in this field have used Fraser Institute's Economic Freedom of the World Index data, Knedlik et al. have chosen the Heritage Foundation index because it has the advantage of offering annual freedom scores for more than 140 countries. In comparison, the Fraser Institute had issued its index every five years between 1975 and 2000 but initially had only covered 53 countries. The panel data analysis shows that conditional aid similarly to unconditional aid does not increase economic freedom, as measured by the Index of Economic Freedom. However, conditional IMF credit has a negative effect on the Fiscal Freedom subcategory, which measures tax rates and government spending. For instance, if one of the conditions of the IMF is fiscal consolidation, that would result in either higher tax rates or lower spending in the recipient country. If the government of any particular recipient country decides to implement the former policy, then the conditional aid would lead to decreased economic freedom score.

The second most important branch of development economics that has utilized the Index of Economic Freedom is human rights literature. The obvious differences in governments' respect and enforcement of human rights across countries have sharpened even further with the advancement of globalization and the improvements of economic freedom globally. Dreher et al. (2010) investigate whether economic freedom and globalization have a significant effect on the way

governments perceive and enforce human rights. The authors have used the KOF Index of Globalization and the two major indices of economic freedom – Fraser’s index and Heritage Foundation’s index – to test the effect of globalization and economic freedom and governments’ respect for human rights in 106 countries between 1981 and 2004. The analysis shows that only some human rights are affected by globalization and economic freedom. For instance, physical integrity rights increase significantly with the increase of economic freedom and globalization, whereas empowerment rights, such as freedom of speech, religious freedom, political participation, etc. are not affected at all. Interestingly, researchers have used both the Fraser’ Institute’s index and the Heritage Foundation’s index and only the coefficients found by using the Fraser Institute Index are statistically significant. A possible reason for that is the significantly larger data pool that the Fraser index offers because it has been issued since 1975.

## **CHAPTER 4**

### **FACTOR AND PRINCIPAL COMPONENT ANALYSIS**

#### **4.1 Problem of Aggregate Indices**

One of the most challenging tasks in creating an index that tracks economic freedom is establishing a comprehensive measurement methodology. Several attempts have been made in the last decades to create aggregate indices that evaluate categories of freedom and assign freedom scores to every individual country examined. As a result of that, researchers have been trying to evaluate critically the different indices and compare their methodologies in order to find out which index gives a better indication of economic freedom.

Caudill et al. (2000) have conducted a study that compares the three most commonly used economic freedom indices – Fraser Institute’s index, Heritage Foundation’s index, and Freedom House’s index. Their study aims to check whether economic freedom could be effectively measured by a single index at all and which categories should this single best index consist of. Caudill et al. have performed a factor analysis and a principal component analysis using data from the three indices. Both factor analysis and principal component analysis are multivariate statistical methods used to reduce and summarize a large number of variables to a few orthogonal constructs which explain much of the variation in



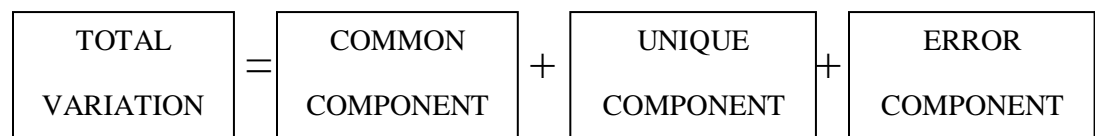
the original data. In aggregate indices involving a large number of independent variables, high correlations among the index categories might suggest the existence of one or few primary, fundamental factors that determine the distribution of the independent variables themselves.

In such cases, each of the categories can be considered to be one of the axes defining a space within which the range of values in the data set vary. The principal component technique redefines this space in terms of a new set of axes, minimizing the number of directions along which the data varies. Each of the axes thus obtained through the analysis is a principal component or an unobserved, underlying factor of the set of categories. In general, the greater the correlation between each of the variables examined, the fewer the principal components that will be extracted as underlying factors for the data base. Focus is usually placed on the first principal component as it accounts for the greatest percent of variation in the data set and yields the most important factor underlying the variables. If the analysis does extract a component that explains all or a significant portion of the variation in the data set, one can claim that there is a single axis (or, spectrum) along which the data set varies. The relation between the set of categories and each principal component is summarized in an eigenvector, and although the principal components are unobserved features, values for each of the components can be derived from these eigenvectors.

## 4.2 Overview of Factor and Principal Component Analysis

Although factor analysis and principal component analysis are both statistical methods for explaining the covariance relationships among a number of observed variables in terms of a much smaller number of unobserved variables, the major difference between the two methods is the variance that each method is trying to explain. While factor analysis extracts factors that explain as much of the common variance between all the variables as possible, principal component analysis extracts components which explain as much of the total variance as possible. Hence, in order to understand the difference between the two methods, it is important to consider the notion of total variance and its building blocks. As outlined in Figure 3, the total variance of each variable in this type of analyses can be partitioned into the sum of a common component, a specific (unique) component, and an error component. Thus, factor analysis tries to explain the variability in the common component, which in turn is part of the total variance that the principal component analysis seeks to explain.

**Figure 3**  
**Total Variation Components**



Typically, factor analysis and principal component analysis consist of three steps: (1) creation of a correlation matrix, (2) extraction of factor loadings, and (3) calculation of communalities.

Step 1: Factor and principal component analysis begin with creating a correlation matrix that shows the intercorrelations among the variables being studied. Creating the correlation matrix directs the analysis towards identifying the underlying constructs called “factors” based on these intercorrelations between the original variables. After the correlation matrix has been constructed, the next step in the analysis is determining how many factors need to be extracted.

Step 2: Factor extraction is performed based on the coefficients in the correlation matrix. The correlation coefficients of the original variables are used to calculate the coefficients of the same original variables to the hypothetical factor constructs, called “loadings.” After the first factor is extracted, its effect is removed from the correlation matrix and the residual correlations are examined. The factor loadings are extracted until no significant variance is left and once all the factors have been extracted, a table of factor loadings is created with the estimated factor loadings from the factor extraction process. This table contains both the factor loadings and the correlations between the factors (or components) and the variables used in the analysis (in this case the economic freedom categories), called communalities.

Step 3: The communalities of the factor loadings or components are equal to the sums of the squared correlations for the variables over all of the extracted

factors. For instance, if two factors are extracted, whereby the loading on Factor 1 is equal to 0.63 and the loading on Factor 2 equals -0.37, then the communality for this variable would be  $(0.63)^2 + (-0.37)^2 = 0.53$ . After the factor loadings and communalities have been computed, understanding, interpreting, and naming the factor scores correctly is the final goal of any researcher using factor analysis to minimize a large pool of data.

In this study I have used both factor analysis and principal component analysis because of the nature of the index-building techniques used in constructing the Heritage Foundation's Index of Economic Freedom, namely averaging and summing of freedom scores. Caudill et al. hypothesize that since neither summing nor averaging account for the correlations between the item scores measuring economic freedom, principal component analysis should reduce the effects of correlation and produce a first principal component that explains the majority of the total variance in the original data.

#### **4.3 Factor and Principal Component Analysis Findings with the 1995 and 1998 Heritage Indices**

Utilizing these two methods, Caudill et al. find that the first two factors of the Heritage Foundation index from 1995 correlate highly with two of the index's categories – Capital Flows and Foreign Investment, and Black Markets<sup>1</sup> – and explain 51.5% of the common variance in the ten categories while the index itself

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<sup>1</sup> The Heritage Foundation's Index of Economic Freedom categories have been modified in subsequent editions; the "Capital Flows and Foreign Investment" category is currently named "Investment Freedom" and the "Black Markets" category has changed to "Freedom from Corruption".

explains 47.1% of the total variance. Additionally, principal component analysis proves that the first principal component accounts for 47.98% of the total variance in the data, which represents a slight improvement to the Heritage index itself.

Similarly, when looking at the 1998 index data, the researchers find an identical pattern. The first factor correlates highly with Wage and Price Controls (now known as Labor Freedom), Capital Flows and Foreign Investment (i.e. Investment Freedom), and Banking (i.e. Financial Freedom) while the second factor correlates significantly with Property Rights and Black Market activities (known as Freedom from Corruption in current editions of the index). These first two factors explain 57.2% of the common variance whereas the aggregate index explains 53.7% of the total variance. Similar to the 1995 results, the first principal component explains 54.3% of the total variation in the ten freedom categories.

Clearly, however, almost 50% of the total variance is not accounted for by the index. The other two indices examined in the study, Fraser's index and Freedom House's index, show similar results, which confirms the hypothesis of the authors that economic freedom is not one-dimensional and cannot be easily captured by a single index.

The study conducted by Caudill et al. provides important techniques for understanding the methods for measuring economic freedom. However, the data used for the portion of the study that analyzes the Heritage index is very limited because the index had just been launched. Hence, Caudill et al. have used only the data from the 1995 and the 1998 Heritage index as reference points. Therefore,

updating the analyses that this study presents could help us better understand whether their results are robust and whether their findings have been consistent over the existence of the index.

#### 4.4 Using Factor and PCA with the 2012 Heritage Index

Below is a three-step analysis of the 2012 Heritage Index of Economic Freedom. Table 1 summarizes the correlation matrix of the ten variables used in the index. From the 45 pairwise correlations in Table 1, five are not significantly different from zero at the 90% confidence interval. Using the data from the 1995 index, Caudill et al. find that seven of the correlations are statistically not significantly different from zero while data from the 1998 index suggests that only two of the pairwise correlations are not significantly different from zero.

**Table 1**  
**Heritage Index Correlation Matrix (2012)**

	BF	TF	FISF	GS	MF	IF	FINF	PR	FCOR	LF
BF	1.00									
TF	0.46	1.00								
FISF	-0.03	-0.03	1.00							
GS	-0.24	-0.22	0.37	1.00						
MF	0.39	0.41	-0.05	-0.04	1.00					
IF	0.61	0.60	-0.15	-0.17	0.52	1.00				
FINF	0.60	0.57	-0.08	-0.16	0.50	0.83	1.00			
PR	0.72	0.49	-0.27	-0.32	0.48	0.71	0.73	1.00		
FCOR	0.68	0.49	-0.30	-0.37	0.42	0.64	0.65	0.94	1.00	
LF	0.44	0.17	0.16	-0.06	0.24	0.24	0.30	0.33	0.32	1.00

The next step in our factor analysis, the factor loadings extraction, is presented in Table 2a. The first factor is highly correlated with Freedom from Corruption and Property Rights while the second factor is highly correlated with Financial Freedom and Investment Freedom. Hence, the first factor could tentatively be called “Rule of Law” while the second one could be named “Open Markets.”

Looking at the variance explained by the first and the second factor and the total cumulative variance, we can estimate that Factor 1 explains  $(4.415/9.660)*100=45.70\%$  of the variance whereas Factor 2 explains  $(0.829/9.660)*100=8.58\%$  of the variance. Thus, overall the first and the second factor account for 54.28% of the total variance.

**Table 2a**  
**Factors of the 2012 Heritage Index**

	Factor Loadings		Communality	Uniqueness
	Factor 1	Factor 2		
BF	0.578528	0.461426	0.547609	0.452391
FCOR	0.928179	0.314780	0.960603	0.039398
FINF	0.426693	0.809083	0.836681	0.163319
FISF	-0.346918	0.072368	0.125589	0.874410
GS	-0.400035	0.015153	0.160257	0.839741
IF	0.417243	0.803110	0.819078	0.180923
LF	0.272867	0.219990	0.122852	0.877148
MF	0.285660	0.496257	0.327873	0.672127
PR	0.865386	0.441850	0.944124	0.055877
TF	0.325729	0.542615	0.400531	0.599470

Factor	Variance	Cumulative	Difference	Proportion	Cumulative
Factor 1	4.415492	4.415492	3.585786	0.841816	0.841816
Factor 2	0.829705	5.245197	---	0.158184	1.000000
Total	5.245197	9.660689		1.000000	

Finally, performing principal component analysis shows that the single best index, or the first principal component, accounts for 48.98% of the total variance, whereas the index itself explains only 43.66% of the variance (Table 2b). These results represent a small improvement from 1995 and a small decrease from the results of the analysis conducted in 1998.

In conclusion, to test if there is indeed a single underlying factor, an unobserved variable that determines which categories contribute to economic freedom, I factor analyzed the Heritage Foundation data using factor and principal component analysis. Through my results, I was able to conclude that economic freedom is not one dimensional and that attempts to aggregate so many variables into a single index might result in loss of information and misranking of countries.



**Table 2b**  
**First Principal Component of the 2012 Heritage Index**

	Correlations between the Index and the 10 Freedom Categories		First Principal Component Communality
	Correlations	Squared Correlations	
BF	0.782978	0.613054	0.360701
FCOR	0.620253	0.384714	0.306705
FINF	0.049085	0.002409	-0.09849
FISF	-0.00714	0.000051	-0.15991
GS	0.599476	0.359371	0.277350
IF	0.835435	0.697951	0.386052
LF	0.846462	0.716497	0.385603
MF	0.843549	0.711575	0.414048
PR	0.784479	0.615407	0.397191
TF	0.514359	0.264565	0.191599

Sum of the Squared Correlations between the Index and 10 Freedom categories:	4.3656
Percent of Total Variance Explained by Index:	43.66%
Cumulative Proportion of First Principal Component:	0.4898
Percent of Total Variance Explained by the First Principal Component:	48.98%

## CHAPTER 5

### ECONOMIC FREEDOM AND ECONOMIC GROWTH: CAUSALITY INVESTIGATION

#### 5.1 Introduction

Numerous studies have shown that a strong correlation exists between economic freedom and growth. However, the direction of causality between freedom and growth has been unclear. Heckelman (2000) investigates the causal relationship between freedom and growth by using a Granger-causality test. Heckelman's study differs from previous attempts to define the causality link between economic freedom and growth (Farr et al. (1998) and Heckelman and Stroup (1999)) because it is based on data from the Heritage Foundation's Index of Economic Freedom. Heckelman also identifies the need to use Granger-causality tests not only on the aggregate index but also on its underlying components in order to identify which freedoms matter for growth and which freedoms actually deter growth. The advantage for using data from the Heritage Foundation's index in conducting this study lies in the fact that the Heritage Foundation's measures are primarily dependent on government policies whereas Fraser Institute's measures are macroeconomic outcome variables. More importantly, the Heritage Foundation has kept its rating system consistent and produces the index annually, which could ease the analysis of the short-term

contributions of economic freedom to growth. Heckelman (2000) has identified two pitfalls of his analysis:

- Lack of data extended back in time before 1994, leading to insufficient data for analyzing long-term growth effects
- Limited scale for freedom scores (ranging from 1 to 5), causing insufficient distinctions between countries' scores

Since releasing its first Index of Economic Freedom publication in 1995, the Heritage Foundation has addressed the limited scale issue. Currently, the index allows for scores to range from 0 to 100, thus allowing for greater differentiability between individual countries scores. In February 2012, the Heritage Foundation released its current evaluation of economic freedom around the world for the eighteenth consecutive year. Therefore, Heckelman's findings on the short-term causal relationship between freedom and growth can be updated using data covering the period 1994-2011.<sup>2</sup> The purpose of this study is to update Heckelman's analysis and to check whether the Granger-causality relationship between economic freedom and economic growth has been consistent since 1997.

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<sup>2</sup> The Heritage Foundation Index of Economic Freedom measures economic freedom for the year before the release of the index. Thus, the first ever Heritage Foundation index, the 1995 Index of Economic Freedom, actually measured economic freedom in 1994. Similarly, the last available index from 2012 actually measures freedom around the world in 2011.

## 5.2 Empirical Methodology

### 5.2.1 Granger Causality Overview

The Granger approach was developed in 1969 and in its essence it tests whether a variable X causes another variable Y in order to see how much of the current values of Y can be explained by past values of Y and then to check whether adding lagged values of X can improve the explanation. Y is said to be Granger-caused by X if X helps in the prediction of Y, or equivalently if the coefficients on the lagged X's are statistically significant. It is important to note that two-way causation is frequently the case, i.e. X Granger causes Y and Y Granger causes X. However, the statement "X Granger causes Y" does not imply that Y is the effect or the result of X. Granger causality measures precedence but does not indicate causality. When performing Granger Causality tests it is important to pick a lag length,  $q$ , which corresponds to reasonable beliefs about the longest time over which one of the variables could help predict the other. Then, the statistical program runs bivariate regressions of the form:

$$y_t = a_0 + a_1 y_{t-1} + \dots + a_q y_{t-q} + b_1 x_{t-1} + \dots + b_q x_{t-q} + e_t$$

$$x_t = a_0 + a_1 x_{t-1} + \dots + a_q x_{t-q} + b_1 y_{t-1} + \dots + b_q y_{t-q} + u_t$$

for all possible pairs of series in the group. The reported F-statistics are the statistics for the joint hypothesis  $b_1 = b_2 = \dots = b_q = 0$  for each equation. The null hypothesis is that X does not Granger-cause Y in the first regression and that Y does not Granger-cause X in the second regression.

### 5.2.2 Freedom-Growth Relationship

Since the Heritage Foundation's score methodology changed to allow scores to vary from 0 to 100, where 100 signifies a perfectly free economy, we expect to find a directly proportional relationship between freedom and growth. The Ordinary Least Squares regression for the 2012 Index of Economic Freedom data is presented below:

$$\text{GROWTH9411}_i = 4.826 - 0.014 * \text{FREEDOM11} + e_i$$

(4.015) (-0.697)

GROWTH9411 is the average annual growth rate from 1994 to 2011 taken from the World Economic Outlook (2012); FREEDOM11 is the Heritage Foundation freedom score for the year 2011, which is published in the 2012 Index of Economic Freedom;  $e$  is the regression residual for each country  $i$  included in the regression.

Despite the longer time span, the reported regression suggests a statistically insignificant inverse relationship between freedom and growth, which contradicts existing studies and our expectations. However, it is possible that freedom is endogenous to growth, making Ordinary Least Squares an inappropriate estimator. Therefore, in the next subsection a series of Granger Causality tests are conducted to determine if one variable consistently predetermines the other or if freedom and growth are jointly determined by a third, unknown variable.

### 5.2.3 Granger Causality Tests

As outlined in the Granger Causality methodology section, a series is said to Granger-cause another series if past values of the first improve our understanding and ability to predict the values of the second. If one variable does not precede the other in this intertemporal sense, then lagged (previous) values of that variable should not improve the predictive power of the other variable. To see whether economic freedom proceeds growth and vice versa we need to explore the following regressions:

$$(1) \text{GROWTH}(t)_i = \alpha + \sum_{j=1}^q \beta_j \text{GROWTH}(t-j)_i + \sum_{j=1}^q \gamma_j \text{FREEDOM}(t-j)_i + \mu(t)_i$$

$$(2) \text{FREEDOM}(t)_i = \kappa + \sum_{j=1}^q \theta_j \text{FREEDOM}(t-j)_i + \sum_{j=1}^q \lambda_j \text{GROWTH}(t-j)_i + \nu(t)_i$$

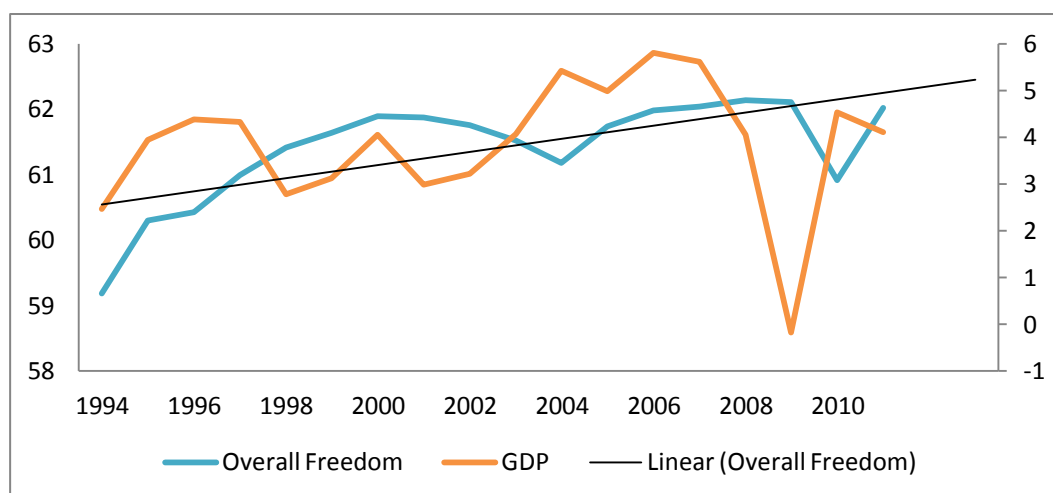
If the vector of  $\gamma$  coefficients is significant but the vector of  $\lambda$  coefficients is not, then we can conclude that freedom proceeds growth. If the test rejects the significance of  $\gamma$  but does not reject the significance of  $\lambda$ , then we can conclude that growth predicts freedom. If we do not reject either set of coefficients, then growth and freedom are jointly determined by a third factor. Therefore, in order to claim that freedom Granger-causes growth, the test must also reject that growth Granger-causes freedom. Finally, if we reject the significance of both  $\gamma$  and  $\lambda$ , we can conclude that freedom is not related to growth at all.

## 5.3 Descriptive Statistics

To conduct Granger causality tests, I have used economic freedom scores from the Heritage Foundation's Index of Economic Freedom (1995-2012) and

annual real GDP growth rates from World Economic Outlook (2012). The complete datasets present data for 184 countries but since Granger causality tests use lagged values for economic freedom scores and annual growth rates, missing observations have been removed from the dataset that has been used in this analysis. The historical movement of the average overall economic freedom score relative to annual GDP growth rates from 1995 to 2012 is presented in Figure 4.

**Figure 4**  
**Historical Movement of Economic Freedom Scores vs. GDP Growth Rates (1994-2011)**



As a result, the current analysis presents a total of 18 annual observations, from 1994 to 2011, for 91 countries, which are listed alphabetically in Appendix I. The average values in the sample for each variable and year are listed in Table 3.

**Table 3**  
**Descriptive Statistics: Means (Standard Deviations) for N=91 countries**

	1994	1995	1996	1997	1998	1999
GDP	2.46 (6.64)	3.94 (4.29)	4.38 (3.82)	4.33 (3.71)	2.79 (4.38)	3.13 (3.69)
Overall	59.19 (10.73)	60.30 (9.99)	60.42 (9.67)	60.99 (9.52)	61.41 (9.37)	61.64 (9.20)
BF	68.68 (14.08)	67.20 (13.02)	67.53 (13.65)	67.20 (13.59)	66.70 (13.19)	66.54 (13.05)
TF	57.85 (19.13)	60.01 (17.00)	60.06 (17.25)	61.96 (16.85)	62.10 (16.38)	63.10 (16.18)
FisF	65.31 (15.02)	67.06 (14.10)	67.20 (14.69)	67.65 (14.68)	68.46 (14.73)	69.76 (13.68)
GS	66.10 (26.45)	65.59 (27.57)	67.21 (24.86)	69.01 (23.45)	69.77 (23.60)	70.12 (21.24)
MF	61.81 (25.57)	63.41 (22.85)	64.99 (20.91)	67.81 (19.31)	71.75 (15.77)	73.94 (14.39)
IF	59.67 (15.01)	60.33 (14.10)	59.89 (13.78)	59.89 (14.10)	59.89 (15.02)	59.67 (14.72)
FinF	53.30 (16.13)	54.84 (15.87)	55.93 (15.91)	56.15 (15.40)	54.62 (15.80)	53.52 (15.94)
PR	57.36 (19.43)	58.46 (19.09)	58.46 (19.55)	56.92 (20.04)	56.92 (20.26)	56.04 (20.32)
FCor	40.99 (27.04)	44.51 (25.48)	42.58 (21.97)	42.37 (21.94)	42.59 (21.41)	42.09 (21.03)
LF	NA	NA	NA	NA	NA	NA



**Table 3**  
**Descriptive Statistics: Means (Standard Deviations) for N=91 countries (Continued)**

	2000	2001	2002	2003	2004	2005
GDP	4.05 (2.99)	2.99 (3.14)	3.22 (4.07)	4.07 (2.99)	5.42 (3.06)	4.98 (2.65)
Overall	61.89 (9.59)	61.88 (9.18)	61.76 (9.12)	61.53 (9.00)	61.18 (9.12)	61.74 (9.01)
BF	65.71 (12.90)	64.89 (12.69)	65.22 (12.63)	65.05 (12.26)	65.05 (12.26)	65.42 (15.55)
TF	65.46 (14.96)	65.21 (14.86)	64.95 (15.56)	66.11 (13.49)	67.78 (13.33)	69.15 (13.08)
FisF	70.98 (13.71)	72.09 (12.66)	72.79 (12.47)	73.49 (12.26)	74.65 (11.59)	75.26 (11.42)
GS	71.67 (19.54)	70.66 (20.03)	69.61 (21.80)	68.90 (20.43)	68.29 (20.49)	68.78 (20.05)
MF	75.64 (15.26)	76.45 (13.88)	77.05 (11.95)	77.72 (10.19)	77.44 (9.49)	77.60 (8.52)
IF	58.35 (15.51)	59.45 (15.87)	57.25 (15.35)	55.71 (17.20)	52.86 (18.75)	53.96 (18.19)
FinF	52.75 (16.54)	54.95 (17.60)	56.48 (17.22)	55.82 (18.32)	53.30 (20.11)	54.51 (18.33)
PR	54.07 (21.55)	50.99 (21.29)	50.66 (21.18)	49.45 (21.21)	49.12 (21.48)	48.68 (21.46)
FCor	42.40 (20.53)	42.16 (20.88)	41.85 (21.18)	41.45 (20.94)	40.91 (20.69)	41.23 (20.68)
LF	NA	NA	NA	NA	62.39 (14.28)	62.81 (14.65)

**Table 3**  
**Descriptive Statistics: Means (Standard Deviations) for N=91 countries (Continued)**

	2006	2007	2008	2009	2010	2011
GDP	5.80 (2.87)	5.62 (2.75)	4.06 (3.42)	-0.18 (4.68)	4.53 (3.57)	4.11 (2.81)
Overall	61.98 (8.94)	62.04 (9.35)	62.14 (9.41)	62.11 (9.50)	60.92 (12.20)	62.02 (9.32)
BF	65.98 (14.62)	66.66 (14.31)	68.04 (14.18)	68.01 (14.92)	67.86 (14.79)	68.37 (15.09)
TF	73.39 (12.63)	73.31 (13.38)	75.39 (9.96)	76.80 (9.65)	77.42 (9.27)	76.92 (9.32)
FisF	75.56 (11.32)	75.93 (11.18)	75.62 (10.95)	76.17 (10.95)	76.80 (10.95)	77.29 (10.85)
GS	70.30 (19.66)	70.26 (20.29)	69.76 (21.11)	69.54 (20.03)	68.46 (20.93)	65.03 (23.03)
MF	75.48 (7.09)	75.12 (6.64)	74.71 (6.70)	71.89 (6.81)	74.88 (7.02)	75.18 (6.61)
IF	53.08 (17.49)	53.63 (18.11)	53.74 (18.84)	53.85 (20.64)	55.05 (20.54)	55.00 (20.40)
FinF	53.85 (17.05)	53.52 (17.22)	53.63 (16.63)	53.41 (16.61)	53.41 (16.48)	53.52 (16.76)
PR	47.91 (21.78)	47.75 (22.11)	47.03 (22.69)	47.09 (22.68)	46.43 (22.53)	45.99 (23.08)
FCor	41.82 (20.78)	41.68 (20.54)	41.55 (19.92)	41.89 (19.80)	41.35 (19.73)	41.01 (19.95)
LF	62.37 (15.12)	62.54 (15.42)	61.87 (15.31)	62.50 (15.89)	61.85 (16.41)	61.85 (15.89)

Source: World Economic Outlook (2012) and 2007-2012 Indices of Economic Freedom

#### **5.4 Does Freedom Granger-Cause Growth?**

Building off of the study conducted by Heckelman (2000), I conducted Granger-causality tests using data from the Heritage Index from 1995 to 2012. By adding 14 more annual observations for each variable, I was able to test the robustness of the results found by Heckelman only four years after the Heritage Foundation's index was published for the first time (summarized in Appendix II). Granger-causality test results based on Equation (2) are presented in Table 4.

Using a single lag for economic freedom and annual real GDP growth rates, we can reject the null hypothesis that freedom does not Granger-cause growth in favor of the alternative hypothesis at the 1% level. This result presents a significant improvement to Heckelman's findings, which were only significant at the 10% level. Adding additional lags further strengthens the Granger relationship, similarly to what Heckelman finds 12 years ago.

However, the reliance on the results for the average economic freedom score could be somewhat misleading because it does not reveal the relationship between the respective freedom categories and growth. Using 1 lag, the coefficients of six of the ten freedom categories are statistically significant: Fiscal Freedom, Government Spending, and Investment Freedom at the 1% level; Monetary Freedom and Property Rights at the 5% level; and Trade Freedom at the 10% level. Interestingly, when using data for 1994-1997, Heckelman finds that only the coefficient for Monetary Freedom (called Monetary Policy at the time) is statistically significant at conventional confidence levels.

Adding one more lag to the analysis gives us very similar results. With 2 lags, the same six freedom categories have statistically significant coefficients. However, the coefficient for Trade Freedom is now significant at the 5% level (instead of 10% when using 1 lag) whereas the coefficients for Investment Freedom and Property Rights are now significant at the 5% and 10% levels, respectively. In contrast to Heckelman's findings, Fiscal Freedom is statistically significant when using 2 lags. However, Labor Freedom and Business Freedom, which were called Wage and Price Controls and Regulation, respectively) are not statistically significant at conventional levels when using 2 lags on the 1994-2011 data.

Finally, performing Granger-causality tests with 3 lags gives us results which improve the significance of some of the categories, and surprisingly, decrease the significance of others. For instance, when using 3 lags the coefficients on Investment Freedom and Property Rights are not significant any more at conventional levels. In addition to that, Trade Freedom is now significant at the 10% level, decreasing steadily from 1% with the respective increase in lags. On the other hand, Fiscal Freedom, Government Spending, and Monetary Freedom are now significant at less than 1%, which shows a continuous improvement with the addition of each extra lag for Monetary Freedom and a steadily significant result under 1% for the other two categories when using any number of lags. In comparison to the results obtained in 2000, only Monetary Freedom was statistically significant both in Heckelman's study and in the current

analysis. Trade Freedom, Fiscal Freedom, and Government Freedom on the other hand had statistically insignificant coefficients in the analysis based on the 1994-1997 data, whereas Investment Freedom, Financial Freedom, Labor Freedom, Property Rights, Business Freedom and Freedom from Corruption had robust results 14 years ago but do not appear to be statistically significant in the current study. Interestingly, all four of the freedom categories that are statistically significant when using 3 lags belong to the group of *objective categories*, i.e. their scores are calculated based on mathematical formulas, thus minimizing subjective score interpretation based on outside factors.

**Table 4**  
**Granger Causality Results: Freedom-Growth Direction (1994-2011)**

Freedom Measure	Economic Freedom does not Cause Economic Growth					
	1 lag (N=1,547)		2 lags (N=1,456)		3 lags (N=1,365)	
	F-stat	p-value	F-stat	p-value	F-stat	p-value
Average Score	7.43	0.01	5.00	0.01	5.36	0.00
Trade Freedom	3.12	0.08	3.61	0.03	2.17	0.09
Fiscal Freedom	17.20	0.00	6.25	0.00	7.74	0.00
Gov. Spending	18.65	0.00	14.24	0.00	4.76	0.00
Monetary Freedom	4.60	0.03	22.33	0.00	22.64	0.00
Investment Freedom	7.25	0.01	3.30	0.04	1.45	0.23
Financial Freedom	1.88	0.17	0.82	0.44	0.65	0.58
Labor Freedom	0.37	0.54	0.17	0.85	0.80	0.50
Property Rights	5.93	0.02	2.69	0.07	1.85	0.14
Business Freedom	2.53	0.11	1.79	0.17	2.02	0.11
Freedom from Corruption	1.48	0.22	0.57	0.57	0.18	0.91

## 5.5 Does Growth Granger-Cause Freedom?

Results from Granger-causality tests for economic growth causing freedom, as outlined by Equation (2), are presented in Table 5. With the 1-lag structure on economic freedom and economic growth, we can reject the null hypothesis that economic growth does not Granger-cause economic freedom in favor of the alternative hypothesis at the 10% level. Adding one additional lag improves this result even further and makes the coefficients on the lagged growth scores statistically significant at the 1% level. However, this result is weakened when using 3 lags, leading again to statistically significant coefficients for overall economic freedom at the 10% level. Surprisingly, Heckelman's results from his study conducted on data from 1994 to 1997 present the opposite results. With p-values ranging from 0.74 to 0.99 with 1, 2, and 3 lags respectively, Heckelman's Granger-causality test results cannot reject the null hypothesis that growth Granger-causes freedom. Moreover, Heckelman (2000) finds that none of the freedom category coefficients, except for the coefficient for Government Spending (known as Government Intervention in earlier editions of the index) with 2 lags, is statistically significant at conventional levels.

Using data from 1994 to 2011 with 1 lag, we obtain six statistically significant coefficients for the underlying freedom categories: Trade Freedom, Government Spending, Business Freedom and Investment Freedom at the 10% level; Financial Freedom at the 5% level, and Property Rights at the 1% level. Adding one more lag gives us the same results for Investment Freedom, Financial

Freedom, and Property Rights and improves the results for Business Freedom and Labor Freedom. With 2 lags, Labor Freedom is statistically significant at the 5% level and Business Freedom is significant at the 1% level. Trade Freedom, on the other hand, falls out of the list of significant categories with a p-value of 0.12.

Finally, looking at a 3-lag structure we obtain four statistically significant coefficients: Trade Freedom at the 5% level, Labor Freedom at the 10% level, Property Rights at the 1% level, and Business Freedom at the 5% level. As we can see from the results in Table 5, Freedom from Corruption is not statistically significant for any lag structure.



**Table 5**  
**Granger Causality Results: Growth-Freedom Direction (1994-2011)**

Freedom Measure	Economic Growth does not Cause Economic Freedom					
	1 lag (N=1,547)		2 lags (N=1,456)		3 lags (N=1,365)	
	F-stat	p-value	F-stat	p-value	F-stat	p-value
Average Score	2.76	0.10	15.75	0.00	2.25	0.08
Trade Freedom	3.66	0.06	2.10	0.12	3.08	0.03
Fiscal Freedom	0.77	0.38	1.13	0.32	0.97	0.41
Gov. Spending	2.84	0.09	1.62	0.20	2.04	0.11
Monetary Freedom	0.02	0.88	1.86	0.16	1.25	0.29
Investment Freedom	3.63	0.06	2.39	0.09	1.24	0.29
Financial Freedom	5.78	0.02	3.13	0.04	1.96	0.12
Labor Freedom	0.73	0.39	3.85	0.02	2.21	0.09
Property Rights	13.59	0.00	5.73	0.00	3.54	0.01
Business Freedom	3.31	0.07	4.82	0.01	2.64	0.05
Freedom from Corruption	0.21	0.65	0.28	0.76	0.97	0.41

## 5.6 Conclusion

Considering the results of the Granger-causality tests in both directions as outlined above, we can conclude that the causality direction between growth and freedom is complex and multifaceted. Test results are summarized in Table 6.

**Table 6**  
**Granger Causality Test Outcomes (1994-2011)**

	Growth (1 lag)			Growth (2 lags)			Growth (3 lags)			Overall
	10%	5%	1%	10%	5%	1%	10%	5%	1%	Outcome
Overall	↔	→	→	↔	↔	↔	↔	→	→	→ / ↔
TF	↔	×	×	→	→	×	↔	←	×	—
FisF	→	→	→	→	→	→	→	→	→	→
GS	↔	→	→	→	→	→	→	→	→	→
MF	→	→	×	→	→	→	→	→	→	→
IF	↔	→	→	↔	→	×	×	×	×	—
FinF	←	←	×	←	←	×	×	×	×	← / ×
LF	×	×	×	←	←	×	←	×	×	← / ×
PR	↔	↔	←	↔	←	←	←	←	←	← / ↔
BF	←	×	×	←	←	←	←	←	×	← / ×
FCor	×	×	×	×	×	×	×	×	×	×

<u>Legend:</u>	
→	Freedom Precedes Growth
←	Growth Precedes Freedom
↔	Growth and Freedom are Jointly Determined
×	Growth and Freedom are NOT Related
—	Cannot be Determined

Granger-causality tests across three lag specifications suggest that there are four robust causality relationships between freedom and growth:

1. Fiscal Freedom Granger-causes economic growth
2. Government Spending Granger-causes economic growth
3. Monetary Freedom Granger-causes growth
4. Freedom from Corruption and economic growth are not related

Interestingly, the third result is consistent with Heckelman's findings. Monetary Freedom (previously called Monetary Policy) has been consistently significant in Granger-causality tests with any number of lag specifications in the period between 1994 and 1997 and over the entire span of the index, as tested by the current analysis. In contrast to Heckelman's findings, however, Fiscal Freedom (previously known as Taxation) Granger-causes growth and is statistically significant across all lag specifications. In addition to the results for Fiscal Freedom, results for Government Spending (Government Intervention) and Freedom from Corruption (Black Markets) also contradict Heckelman's findings. Although Heckelman found that growth Granger-causes Government Intervention, this study finds that the opposite causality direction holds true for data from 1994 to 2011. Finally, Heckelman's results from 2000 establish a weak causality relationship running in the direction from Freedom from Corruption to growth but this analysis finds that growth and Freedom from Corruption are unrelated.

In addition to the four robust relationships discussed above, the current analysis finds that the causality links between several of the freedom categories

are unclear or cannot be determined. Most importantly, results from this analysis suggest that using lagged values of economic freedom and economic growth cannot help us explain the direction of causality between the two categories. The 1-lag and 3-lags analyses suggest that freedom might Granger-cause growth but the results from the 2-lag analysis weaken this hypothesis and suggest that the two variables might be jointly determined by a third, unknown variable.

Additionally, the causality link between growth and Trade Freedom as well as growth and Investment Freedom cannot be determined, given the outcomes of the analysis in Table 6, because two or more causality directions have been suggested by the results. As highlighted in the Granger-causality test subsection, Investment Freedom is a freedom category that belongs to the list of *subjective categories*. Furthermore, although Trade Freedom is one of the objective freedom categories, it is important to note that it is affected by the subjective calculation of penalty points for Non-Tariff Trade Barriers (NTBs). Hence, we can conclude that the subjective nature of the measurement methodologies for these two categories could be an important contributor to the inconsistent results of the Granger-causality tests.

Finally, results for Financial Freedom, Labor Freedom, and Business Freedom suggest that these categories are either not related to growth or are Granger-caused by growth. Property Rights, on the other hand, is either Granger-caused by growth or both variables are jointly determined by a third factor.

## **CHAPTER 6**

### **CONCLUSION**

Different economic freedom categories have a different relationship to growth. In this thesis, I analyzed the quality of the Heritage Foundation's Index of Economic Freedom in comparison to its first two factors and its first principal component and I concluded that economic freedom is not one dimensional. Having established that, I suggested that the subjectivity involved in the measurement of several of the freedom categories might have an important impact on the ability of the index, as an aggregate measurement of economic freedom, to predict economic growth. To test this hypothesis, I performed a series of Granger-causality tests using 1, 2 and 3 lags and concluded that the causality direction between economic freedom and economic growth is unclear because the two variables might be jointly determined by a third, unknown factor. Another important aspect of my research explored the causality relationship between the disaggregated ten freedom categories of the Heritage index and economic growth and established three freedom categories which consistently Granger-cause economic growth across all three lag-structures: Monetary Freedom, Fiscal Freedom, and Government Spending.

The research reported in this paper carries primarily two contributions. Since 2000, in the literature on economic freedom and its relationship to economic growth, there has been no study that tracks the progress of the Index of Economic Freedom published by the Heritage Foundation. This study thus adds to the empirical literature on economic freedom measurements and suggests that the first principal component and the first two factors of the index explain more than 50% of the variance in the index data, confirming the results of Caudill et al. (2000). Second, the demonstrated causality relationships or the lack of such for the overall economic freedom score and the respective freedom category scores have important research and policy implications. In particular, finding that economic freedom, as measured by the Heritage index, used to have a significant causal relationship to growth in Heckelman's study in 2000 and does not appear to have a robust relationship to growth in the current study suggests the declining quality of the Heritage Foundation's Index of Economic Freedom. Finally, my work supports the hypothesis that not all economic freedoms contribute to economic growth and establishes that (1) Monetary Freedom, Fiscal Freedom, and Government Spending are the only three freedom categories which contribute to growth; (2) Freedom from Corruption is not related to economic growth; and (3) the relationship of six of the freedom categories and the overall freedom score to growth cannot be determined using data from the Heritage Foundation's Index of Economic Freedom. These results are useful in evaluating the credibility of the Heritage Foundation's index and aggregate indices of economic freedom in

general, as well as in the context of formulating efficient economic policies to affect economic growth and development.

There are several important implications for developing countries based on the results of this thesis. First, this study has suggested that there are only three factors that could lead to improving prosperity: Monetary Freedom, Fiscal Freedom, and Government Spending. By looking at the variables that comprise these three freedom categories, we can identify the areas that reforms should focus on in order to achieve long-term growth.

#### 1. Monetary Freedom

Monetary Freedom measures price stability and assesses price controls currently in place in a given country by stressing the importance of maintaining price stability and penalizing countries where microeconomic interventions in the economy are needed to control inflation rates. The robust results of the Granger-causality tests suggest that improving prosperity by increasing Monetary Freedom would require countries to keep inflation rates low without implementing extensive price control mechanisms.

#### 2. Fiscal Freedom

The Fiscal Freedom category measures the overall tax burden imposed by governments by looking at the top tax rates on individual and corporate income as well as the total tax burden as a percentage of GDP. Hence, creating an

environment conducive to economic growth would require countries to keep tax rates at attractive low levels and to maintain a relatively low tax burden as a percentage of GDP.

### 3. Government Spending

Government Spending provides an evaluation of the level of government expenditure as a percentage of GDP. Although no ideal level of government spending has been identified by the researchers at the Heritage Foundation, levels of government expenditure that are close to zero are lightly penalized by the index measurement methodology while levels that exceed 30% of GDP get severely penalized. Thus, the results of this analysis suggest that developing countries can spur growth by keeping government expenditure levels close to zero.



## APPENDIX I

### COUNTRIES INCLUDED IN GRANGER CAUSALITY SAMPLE (LISTED ALPHABETICALLY)

Albania	Guatemala	Russia
Algeria	Guinea	Singapore
Argentina	Guyana	Slovakia
Australia	Haiti	South Africa
Austria	Honduras	South Korea
Bahamas	Hong Kong	Spain
Bahrain	Hungary	Sri Lanka
Bangladesh	India	Swaziland
Belarus	Indonesia	Sweden
Belize	Ireland	Taiwan
Bolivia	Italy	Tanzania
Botswana	Jamaica	Thailand
Brazil	Japan	The Philippines
Bulgaria	Jordan	Tunisia
Cameroon	Kenya	Turkey
Canada	Madagascar	Uganda
Chile	Malawi	Ukraine
China	Malaysia	United Kingdom
Colombia	Mali	United States
Costa Rica	Mexico	Uruguay
Cote d'Ivoire	Moldova	Venezuela
Dominican Republic	Mongolia	Vietnam
Ecuador	Morocco	Yemen
Egypt	Mozambique	Zambia
El Salvador	Nicaragua	
Estonia	Nigeria	
Ethiopia	Oman	
Fiji	Pakistan	
France	Panama	
Gabon	Paraguay	
Germany	Peru	
Ghana	Poland	
Greece	Portugal	
	Romania	

## APPENDIX II

### HECKELMAN (2000) GRANGER TEST RESULTS

**Table 7**  
**Heckelman (2000) Results: Freedom-Growth Direction (1994-1997)**

Economic Freedom does not Cause Economic Growth						
Freedom Measure	1 lag (N=282)		2 lags (N=188)		3 lags (N=94)	
	F-stat	p-value	F-stat	p-value	F-stat	p-value
Average Score	2.96	0.09	3.96	0.02	4.25	0.01
Trade Policy	0.23	0.63	2.22	0.11	1.47	0.23
Taxation	1.38	0.24	1.81	0.17	1.83	0.15
Gov. Intervention	0.58	0.45	1.14	0.32	1.77	0.16
Monetary Policy	6.17	0.01	2.35	0.10	3.58	0.02
Capital Flows and Foreign Investment	2.19	0.14	3.75	0.03	4.00	0.01
Banking	0.50	0.48	1.93	0.15	2.82	0.04
Wage and Price Controls	0.77	0.38	2.59	0.08	3.51	0.02
Property Rights	1.25	0.26	2.81	0.06	2.77	0.05
Regulation	0.66	0.80	5.00	0.01	2.88	0.04
Black Markets	1.20	0.27	1.50	0.23	2.99	0.04

Source: Heckelman (2000)

**Table 8**  
**Heckelman (2000) Results: Growth-Freedom Direction (1994-1997)**

Economic Growth does not Cause Economic Freedom						
Freedom Measure	1 lag (N=282)		2 lags (N=188)		3 lags (N=94)	
	F-stat	p-value	F-stat	p-value	F-stat	p-value
Average Score	0.11	0.74	0.06	0.94	0.01	0.99
Trade Policy	0.10	0.76	0.31	0.74	0.19	0.90
Taxation	0.34	0.56	0.38	0.68	0.86	0.46
Gov. Intervention	2.57	0.11	3.54	0.03	1.51	0.22
Monetary Policy	0.09	0.76	1.14	0.32	0.18	0.91
Capital Flows and Foreign Investment	0.12	0.73	0.34	0.71	0.21	0.89
Banking	0.94	0.33	0.87	0.42	0.80	0.50
Wage and Price Controls	0.01	0.94	0.10	0.90	0.01	0.99
Property Rights	1.79	0.18	0.47	0.63	0.71	0.55
Regulation	0.25	0.62	0.32	0.72	0.54	0.66
Black Markets	0.99	0.32	1.19	0.31	1.06	0.37

Source: Heckelman (2000)

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