Economic Freedom and Growth:
Decomposing the Effects

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Abstract

Most studies of the relation between economic freedom and growth of GDP have found a positive relation. One problem in this area is the choice of economic freedom measure. A single measure does not reflect the complex economic environment and a highly aggregated index makes it difficult to draw policy conclusions. In this paper we investigate what specific types of economic freedom measures that are important for growth. The robustness of the results is carefully analysed since the potential problem with multicollinearity is one of the negative effects of decomposing an index. The results show that economic freedom does matter for growth. This does not mean that increasing economic freedom, defined in general terms, is good for economic growth since some of the categories in the index are insignificant and some of the significant variables have negative effects.

Keywords: Economic growth, Economic freedom.

JEL classification: O10, O40

1 Introduction

Many empirical studies have found a positive relation between economic freedom and growth (see e.g. Barro, 1991; Barro, 1994; Scully and Slottje, 1991; De Vanssay and Spindler, 1994; Torstensson 1994). Some of these studies have used one or two indicators of economic freedom, such as the black market premium on foreign exchange, while others have used different economic freedom indices. Although different indices show similar results, and even though there can be a high correlation between individual measures and an overall index, the choice of measure is important. A single measure does not fully reflect the economic environment and a highly aggregated index makes it difficult to draw policy conclusions. It is therefore important to investigate which components of the economic freedom indices that are important for growth and the direction of these effects. In this paper we therefore decompose one common measure of economic freedom into seven different categories, and analyse the effects of each category in growth regressions using observations for 74 countries during a period of 25 years.

In the growth literature there has been an extensive discussion on the sensitivity of the empirical findings of growth regressions (see e.g. Levine and Renelt, 1992). Previous studies of economic freedom and growth have in general lacked a sensitivity analysis, but De Haan and Sturm (2000) show, using an extreme bound analysis, that the results can be fragile to the model specification. This type of sensitivity analysis has been criticised, and a less strict sensitivity analysis has been suggested by Sala-i-Martin (1997a,b). We therefore test the robustness of the model specification, by both the extreme bound analysis and the analysis suggested by Sala-I-Martin. Decomposing an index such as the economic freedom index, multicollinearity becomes a potential problem, and therefore we also test for sample robustness for each freedom measure.

The paper is organised as follows. Section 2 contains a presentation of the economic freedom measures and a survey of previous empirical research. The data is presented in section 3. The model specification and the sensitivity analyses are presented in section 4. Section 5 includes the results and comments. Section 6 concludes.

2 Economic Freedom and Growth

Economic freedom does not mean freedom from any state intervention. On the contrary, even in a libertarian society, a minimal state exists providing protection of the freedom for the individuals in society. In this paper we use the economic freedom index in Gwartney et al. (2000). The main components of this index are personal choice, protection of property and freedom of exchange. The index emphasizes two fundamental goals for the government. The first is to provide an infrastructure for the operation of a market economy, which includes secure property rights, enforcement of contracts and stable monetary regimes among other things. Second, the government should provide a few selected goods, which have characteristics that make them difficult for private business to provide, i.e. public goods such as national defence, education, police and environmental protection. Consequently, the definition of economic freedom in Gwartney et al. (2000) is strict, based on a libertarian concept of freedom, and can be disputed. Nevertheless, we assume that this index is a good measure of economic freedom, although this is not of central importance since we focus on the different components of the freedom index and analyse their effects on economic growth separately.

In the classical Solow growth model the government, or institutions in general, only play a minor role. With the emergence of endogenous growth models the role of institutions became more evident, through the effects on investments in human and physical capital (see e.g. Barro 1990). The work of North (1990) and others suggest that also institutions, such as the economic environment, are important for long-term economic growth. One interesting question is what properties of the institutions that foster economic growth, or in our case, what type of economic freedom, that foster long-term growth. Since the economic freedom index in Gwartney et al. (2000) consists of several categories of economic freedom this index is suitable for testing the importance of different types of economic freedom on growth. Below we present each of the seven categories in Gwartney et al. (2000), and summarise the empirical findings

from previous studies.[1] Each category index is measured on a scale between 0 and 10, where 10 is the highest level of freedom.

The category *Size of Government* measures (a) General government consumption expenditure as a percent of total consumption and (b) Transfers and subsidies as a percent of GDP. Countries with a large proportion of government expenditures or a large transfer sector receive lower ratings. As mentioned above, a certain minimum government size is most likely necessary for a good economic environment in the sense that it is necessary to protect the economic agents and their property. However, the effect on economic growth is more ambiguous for government consumption outside these core functions. Several empirical studies conclude that a large government size hamper growth (Barro, 1991; Knack and Keefer, 1995; Gwartney et al, 1998; Barro, 1999). Other studies find no significant effect of government size (Ayal and Karras, 1998; Nelson and Singh, 1998) or that the relation is non-robust (Levine and Renelt, 1992; Sala-i-Martin, 1997a). Kneller et al. (1999) find that productive expenditures, such as educational and health expenditures, increase growth, while unproductive expenditures, such as social security and welfare expenditures, have no effect on growth.

Economic Structure and Use of Market measures (a) Government enterprises and investments as a share of the economy, (b) Price controls/ Extent to which companies are free to set their own prices, (c) Top marginal tax rate and (d) The use of conscripts to obtain military personnel. More economic freedom means that production and allocation goes through private enterprises and markets rather than governmental and political mandates. Measuring economic freedom with the public investment share, both Sala-i-Martin (1997a) and Ayal and Karras (1998) find a negative relation between the investment share and growth, but Sala-i-Martin (1997a) judges the relation as unstable. Barro (1991) and Torstensson (1994) find no significant relation between public investment share and growth. Ayal and Karras (1998) do not find a significant effect of marginal taxes or conscription on growth. Kneller et al. (1999) find that distortionary

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[1]Many of the individual measures of economic freedom have been included in theoretical growth models but we do not include a survey of these in this study.

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taxes, such as taxes on income and profit, decrease growth, while non-distortionary taxes have no effect on growth.

Monetary Policy and Price Stability measures, (a) Average annual growth rate of the money supply during the last five years minus the growth rate of the real GDP during the last ten years, (b) Standard deviation of the annual inflation rate during the last five years and (c) Annual inflation rate during the most recent year. Countries with a more stable monetary policy receive a higher rating. Some studies show a positive relation between this type of freedom and growth (Ayal and Karras, 1998) and some a negative relation (Gwartney et al. 1998). However, Levine and Renelt (1992) and Sala-i-Martin (1997a) do not find any robust relations.

The fourth category *Freedom to Use Alternative Currencies* measures (a) Freedom of citizens to own foreign currency bank accounts domestically and abroad and (b) Difference between official exchange rate and the black market rate. Countries with low restrictions on foreign currency and a low difference between the exchange rates receive a higher rating. Ayal and Karras (1998) find a negative but insignificant relation between restrictions on foreign bank accounts and growth, while several studies show a negative and significant relation between a high black market premium and growth (Barro, 1994; Levine and Renelt, 1992; Sala-i-Martin, 1997a; Ayal and Karras, 1998) even though the relation is non-robust in Sala-i-Martin (1997a) and Levine and Renelt (1994).

Legal Structure and Security of Private Ownership measures (a) Legal security of private ownership rights/ Risk of confiscation, (b) Viability of contracts/ Risk of contract repudiation by the government and (c) Rule of law: Legal institutions supportive of the principles of rule of law and access to a non-discriminatory judiciary. Countries with a secure property rights structure receive a higher rating. Measures of legal structure and security of private ownership are the type of economic freedom that most consistently is positive and significant in empirical studies (Barro, 1994; Torstensson, 1994; Goldsmith, 1995; Knack and Keefer, 1995; Gwartney et al., 1998;

Hall and Jones, 1999; Barro, 1999). In addition both Sala-i-Martin (1997a) and Levine and Renelt (1994) judge the positive relation as robust.

International Exchange - Freedom to Trade with Foreigners measures (a) Taxes on international trade and (b) Non-tariff regulatory trade barriers. A country with fewer restrictions on trade receives a higher rating. Ayal and Karras (1998) do not find a significant relation between trade restrictions and growth, but a negative and significant relation between trade size and growth. Sala-i-Martin (1997a) applies a number of different measures of freedom to trade, and finds a positive and robust relation for some measures and a non-robust relation for other measures. Torstensson (1994) finds a negative and significant relation between the degree of trade protection and growth.

The final category *Freedom of Exchange in Capital Markets* measures (a) Ownership of banks: Percent of deposits held in privately owned banks, (b) Extensions of Credit: Percent of credit extended to private sector, (c) Interest rate controls and regulations that lead to negative interest rates, and (d) Restrictions on the citizens to engage in capital transactions with foreigners. Countries with few restrictions receive a high rating. Not many studies have included this type of economic freedom. The study of Ayal and Karras (1998) shows a significant negative relation between this kind of restrictions and growth.

3 Data

The data, except for the freedom measures, comes from *1999 World Development Indicators CD-ROM* (World Bank, 1999). The growth rate of income is in constant 1985 US-dollars. The initial GDP per capita data is converted into international dollars using purchasing power parities.

The data on economic freedom is reported in *Economic Freedom of the World: 2000 Annual Report* (Gwartney et al., 2000). The data have been reported every fifth year since 1970. There are three main indices with different weightings of the 23 components of the index. We use the index where the weights are determined by a

principal-component analysis. The index of economic freedom is divided into the seven categories that were presented in the previous section. Each category index is measured on a scale between 0 and 10, where 10 is the highest level of freedom.

The sample includes 74 countries for the period 1975-1995. We wish to study the long-run effects of economic freedom on growth, and therefore the relationship is examined over a relatively long period. Growth and investment share are period averages. The economic freedom variables are average values between 1970 and 1990 since we wish to allow for a lagged effect on growth.[2] Descriptive statistics are presented in table 1. Initial level of GDP is in thousands of dollars per capita, and the investment share is in percentages.

Table 1. Descriptive statistics for countries included in the estimations.

	Mean	Std.	Min	Max
Growth of GDP (GROWTH)	3.47	2.22	-1.83	9.02
Initial level of GDP (GDP75)	2.72	2.13	0.24	8.30
Investment share of GDP (INV)	22.90	5.17	11.05	39.62
Economic freedom index (SUM)	5.68	1.47	3.07	9.39
Size of government (EF1)	7.56	1.36	4.07	10.00
Structure and use of markets (EF2)	3.66	1.73	0.00	9.87
Monetary policy and price stability (EF3)	7.22	1.99	1.34	9.42
Freedom to use alternative currencies (EF4)	5.40	2.85	0.00	10.00
Legal structure and security of private ownership (EF5)	5.58	2.32	1.75	9.74
International exchange - Freedom to trade with foreigners (EF6)	5.81	2.10	0.87	9.78
Freedom of exchange in capital market (EF7)	5.14	2.25	0.00	9.99
No of obs	74			

4   Model Specification and Sensitivity Analysis

4.1   Model Specification

We begin with analysing the effect of economic freedom on GDP growth using an overall index of economic freedom:

$$g_i = \alpha + \delta_1 Y75_i + \delta_2 INV_i + \beta_{EF} EF_i + \varepsilon_i$$

where g_i is average growth, measured as the average value between 1975 to 1995 for each country. $Y75_i$ is initial, 1975, income in US dollars, INV_i is the average investment share to GDP. These variables are often significant in growth and are almost standard in this type of models. EF_i is the average value of the economic freedom index 1970 to 1990. ε_i is a stochastic error term.

We test for exogeneity of the economic freedom index using a Hausman test (see Maddala 1992), where we first run a regression with the economic freedom index as dependent variable. The predicted values from this regression are used as an independent variable in the growth regression, and if the corresponding coefficient is insignificant, the hypothesis of endogeneity can be rejected. For our sample of countries the hypothesis of endogeneity is rejected.[3]

In the next step we decompose the economic freedom index into the categories constructing the index. The estimated model is now

$$g_i = \alpha + \delta_1 Y75_i + \delta_2 INV_i + \sum_j \beta_j EF_i^j + \varepsilon_i$$

where EF_i^j is the economic freedom measure j for country i, and the other variables are the same as in the previous model.

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[2] It may in fact have been more appropriate to use data on economic freedom before 1970, but such data does not exist. It should also be noted that the freedom data have not been reported every fifth year for some countries and categories.

[3] In addition to the original variables we add three regional dummy variables (Sub Sahara Africa, Latin America and Caribbean, and East Asia and Pacific, a secondary school enrolment variable, two dummy variables measuring the degree of political and civil freedom, and a variable measuring the degree of trade (the sum of export and import as a share of GDP) to the regression with economic freedom as dependent variable.

4.2   Sensitivity Analysis

A disadvantage with decomposing an index is the potential problem with multicollinearity between the variables constructing the index. We measure the degree of multicollinearity with the variance-inflation factor and the condition number (see e.g. Maddala 1992). The two measures are only rough indicators of the problem. A high value of the variance-inflation factor (around 5) implies that the significance of the other variables is sensitive to the inclusion of the variable. The condition number measures the sensitivity of the estimates to small changes in the data, and values exceeding 30 indicates a problem with multicollinearity.

We conduct two types of sensitivity analyses. The first is a test of the sensitivity of the sample. We estimate the models on a subset of countries and test the significance of the parameters. We draw randomly without replacement 64 countries, i.e. delete 10 countries, and estimate the models. This is done 1,000 times. Then we calculate the share of number of times each variable is significant at the 10% level. This test is conducted for several reasons. First, we wish to test if the choice of the sample influences the results. Second, we wish to test, in a crude manner, the possible impact of problems with multicollinearity in terms of sensitivity to the sample parameter estimates (in terms of significance and sign).

To check the model specification, or how robust the coefficients of economic freedom are to changes in the conditioning set of information, we apply the extreme bound analysis (see Levine and Renelt, 1992). We eliminate up to three of the economic freedom variables and re-run the model, which results in 41 regressions for each economic freedom variable. For each model, z, we estimate the parameters for economic freedom measure j, β_{jz}, and the corresponding standard deviation, σ_{jz}. The lower extreme bound is defined to be the lowest value of $\beta_{jz} - 2\sigma_{jz}$ and the upper extreme bound to be the largest value of $\beta_{jz} + 2\sigma_{jz}$. If the lower and upper extreme bounds are of opposite sign, then the variable is not robust according to the extreme bound test.

The extreme bound analysis has been criticised for being too restrictive in growth analysis. Sala-i-Martin (1997a,b) suggests a method looking at the whole distribution of the estimator β_{jz}. We start by assuming a normal density function and calculate beta values and standard deviation of all z models, produced in the same way as explained in the extreme bound case. Thereafter the means, $\overline{\beta}_{jz}$ and $\overline{\sigma}_{jz}$, are calculated as the average of the z estimated β values and variances.[4] The cumulative density function CDF(0) can then be constructed using the normal tables. The fraction of significance and the CDF(0) are used to estimate the robustness of the variables when it comes to model specification.

5 Results

5.1 General Economic Freedom Index

We first estimate the model with the overall index of economic freedom and the results are presented in table 2. Note that the standard errors are based on White's (1980) heteroskedasticity-consistent covariance matrix.

Table 2. Results estimations using an overall index of economic freedom: GDP growth.

	Coeff.	P-value
Constant	-3.508	0.00
GDP75	-0.667	0.00
INV	0.222	0.00
EF	0.653	0.00
R-squared	0.57	

Initial GDP level and investment share are highly significant. The coefficient for the initial level of GDP is negative, which is in support of the convergence hypothesis in the exogenous growth literature. The index of economic freedom is significant in all cases, which also confirms the results of previous studies (see e.g. Gwartney et al 1999).

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[4] Sala-i-Martin also calculates the likelihood for all models and constructs a weighted average of beta and the variance. We will not do this since the goodness of fit does not vary considerably in our models.

Consequently, an increase in economic freedom, as measured by the economic freedom index, increases growth.

5.2   Different Measures of Economic Freedom

We now turn to the case with the seven categories of the economic freedom index and the results can be found in Table 3. The standard errors are based on White's (1980) heteroskedasticity-consistent covariance matrix. In the table we also report the tests of multicollinearity and the sensitivity tests of the economic freedom variables. For the sensitivity test of the sample we report the share of number of times the variable is significant (at the 10% level). For the test of specification we report the share of number of times the variable is significant (at the 10% level), the lower and upper extreme bound and the CDF(0) under the assumption that the distribution of the parameter is normal. For the test of sample, a variable passes if the share is at least 0.90. For the extreme bound test, a variable passes if the lower and upper bound is of the same sign. Finally, the critical value of the CDF normal test is set to 0.90. If a variable passes a test, then the corresponding statistic is bold.

Table 3. Results estimations using several measures of economic freedom: GDP growth

	Regression		Multicoll.	Sample-test	Specification-test			
	Coeff	P-value	Variance inflation	Share significant	Share significant	Low	High	CDF normal
Constant	1.563	0.40		0.03				
GDP75	**-0.919**	**0.00**	4.62	**1.00**				
INV	**0.266**	**0.00**	1.65	**1.00**				
EF1	**-0.542**	**0.01**	2.91	**0.96**	0.68	-1.102	0.272	**0.99**
EF2	**0.209**	**0.10**	2.75	0.39	0.51	-0.304	0.294	**0.96**
EF3	0.038	0.71	1.57	0.01	0.05	-0.198	0.837	0.67
EF4	**0.148**	**0.05**	2.19	0.70	0.78	**0.201**	**0.098**	**0.99**
EF5	**0.346**	**0.00**	4.61	**1.00**	**1.00**	-0.278	0.588	**1.00**
EF6	**-0.478**	**0.00**	3.30	**1.00**	0.88	**0.125**	**0.118**	**0.99**
EF7	**0.279**	**0.02**	3.59	0.88	0.88	-0.158	0.445	**0.99**
Condition number	41.61							
R^2	0.71							

Initial GDP level and investment share are still significant and robust and the coefficient for the initial level of GDP is negative, which is in support of the convergence hypothesis. The high condition numbers indicate a potential problem with

multicollinearity, but all variance inflation factors are below 5. Consequently, we should pay particular attention to the sensitivity of the sample. All significant economic freedom variables are robust to the model specification according to their CDF(0), which we consider a sufficient test for this type of robustness. Still, there are significant variables that are fragile to the model specification if the stricter extreme bound test is used. Furthermore, some of the significant economic freedom variables are, as we suspected because of multicollinearity, sensitive to the sample. A summary of the results for the economic freedom variables is presented in Table 4.

The Size of Government (EF1) is significant and the coefficient is negative, implying that a larger government size increases growth. The estimated size suggests that one unit increase of the index decreases the average growth rate by approximately 0.5 percentage points. The variable passes the sample test and there is hence a robust relation between reduced economic freedom, in terms of an increase in the size of the government, and increased growth. This result is somewhat surprising since most previous studies have found a positive or insignificant relation.

Economic Structure and Use of Market (EF2) is significant and positive, and one unit increase of the index increase average growth by 0.2 percentage points However, it passes neither the sample test nor the extreme bound test. Previous studies have not shown a strong support for a relation between this type of economic freedom and growth, and neither have we.

Monetary Policy and Price Stability (EF3) is not significant and is fragile to both the sample and the model specification according to the extreme bound test. Previous studies have also judged this relation as non-robust.

Freedom to Use Alternative Currencies (EF4) has a positive and significant effect on growth. One unit increase of the index increases average growth by 0.15 percentage points. It passes all robustness tests except that it is slightly fragile to the sample. These results conform in general to previous studies, with the exception that our results are robust.

Legal Structure and Security of Private Ownership (EF5) is significant and positive, and the estimated size suggests that one unit increase of the index increases growth by 0.35 percentage points. Even though it does not pass the extreme bound test it is robust according to the other tests. Most previous studies have found a positive and robust relation between this variable and growth, which confirms our result.

International Exchange - Freedom to Trade with Foreigners (EF6) is significant and interestingly there is a negative relation, i.e. freedom to trade decreases growth and the result passes all robustness tests. The result suggests that one unit increase of the index decreases growth by 0.48 percentage points. Contrary to some previous studies we find a negative and robust relation between freedom to trade and growth, while in particular Sala-i-Martin (1997) finds a positive and robust relation between the number of years of open economy and growth. However, Sala-i-Martin also finds a negative, but non-robust, relation between decreased trade-restrictions, which is a measure closer related to our measure, and growth.

Freedom of exchange in capital markets (EF7) is positive and significant, and one unit increase of the index increases growth by 0.28 percentage points. The relation does not pass the extreme bound test but nearly passes the sample test. Since only a few studies include this variable it is difficult to compare with previous studies. Our results do however conform to the results in Ayal and Karras (1998) who find a positive relation.

Consequently, four of the significant economic freedom variables are positively related to growth but two are negatively related. Increased freedom in terms of lower government consumption and transfers and increased freedom to trade with foreigners *decrease* the growth rate. These results are particularly interesting since previous studies most often have found a positive relation. Note, the first relation is robust and the second close to robust.

When it comes to the robustness results, model specification does not seem to be a problem at least not according to the test suggested by Sala-i-Martin (1997a,b). If we

take robustness to the sample into account there is a higher fragility, probably due to multicollinearity. The categories Size of Government and Legal Structure and Security of Private Ownership are robust, and the categories Freedom to Use Alternative Currencies and Freedom to Trade with Foreigners are almost robust, so the overall result is still robustness. Only the categories Market Use and Economic Structure and Monetary Policy and Price Stability are clearly fragile. Among the robust categories Size of Government, Legal Structure and Freedom to Trade with Foreigners has the largest effect on the growth rate. The results suggest that not only are the categories significant, but they also have a sizeable effect on the average growth rate.

Table 4. Significant economic freedom measures. All variables are robust to the model specification. The bold variables are also robust to the sample. The sign in the parentheses indicates if the effect is positive or negative.

Economic Freedom Variable	Sign of the effect	Robustness
Size of Government	Negative	Robust
Economic Structure and use of Markets	Positive	Non-robust
Monetary Policy and Price Stability	Insignificant	Non-robust
Freedom to Use Alternative Currencies	Positive	Almost robust
Legal Structure and Security of Private Ownership	Positive	Robust
Freedom to Trade with Foreigners	Negative	Almost Robust
Freedom of exchange in capital markets	Positive	Almost robust

6 Conclusions

A number of economic freedom measures have a significant and sizeable effect on growth of GDP. If we consider the less strict sensitivity suggested by Sala-i-Martin (1997a,b) all of the significant measures are robust to the model specification, although some are fragile to the sample. Consequently, economic freedom does matter for the growth rate, and the estimated relations are robust overall. This does not mean that increasing economic freedom in general increases growth since some of the categories in the index are insignificant (Monetary Policy and Price Stability) or fragile (Economic Structure and Use of Markets) and since some of the significant variables have a

negative effect on growth (Size of Government and Freedom to Trade with Foreigners). Using an index of economic freedom might therefore be misleading.

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