Does Free Trade Really Reduce Growth?

Further Testing Using the Economic Freedom Index[*]

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Abstract

While studies of the relationship between economic freedom and economic growth have shown it to be positive, significant and robust, it has rightly been argued that different areas of economic freedom may have quite different effects on growth. Along that line, Carlsson and Lundström (2002) present the surprising result that "International exchange: Freedom to trade with foreigners" is detrimental for growth. We find that "Taxes on international trade" seems to drive this result. However, using newer data and a more extensive sensitivity analysis, we find that it is not robust. Least Trimmed Squares-based estimation in fact renders the coefficient positive.

JEL-Classification: E61, F13, F43, O24, O40, P17

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1. Introduction

In a recent article, Carlsson and Lundström (2002) advanced the literature using the Economic Freedom of the World Index (EFI) by investigating the growth effects of the various areas of the index.[1] They reported a surprising finding, namely that the area "International exchange: Freedom to trade with foreigners" exerts a negative influence on economic growth.[2] Here, we show that this result is not robust and caution against using the negative result in offering policy advice.

Even though most economists have argued for a positive effect of free trade, there *are* theoretical arguments both to support the contention that free trade improves economic performance and the opposite view.[3] Hence, this is, in the end, an empirical issue. And the bulk of the literature supports the view that free trade and trade openness does have, at least some, positive effects on efficiency and growth.[4] This

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1. For a survey of this line of research, see Berggren (2003).

2. Cf. Ayal and Karras (1998).

3. See Bhagwati (1994). Cf. Krugman (1987), Srinivasan (1999), and Bhagwati and Srinivasan (2001). Among the arguments pointing at a possible negative relationship between free trade and growth, the following can be mentioned: free trade might reduce growth in countries that do not specialize in research and development or other growth-promoting activities; higher growth rates could lead to higher tariffs rather than the other way around, perhaps due to some political logic, or they could be jointly determined; the effect of one variable, such as free trade, is not always fully manifested in the coefficient of the variable itself but through other variables that are themselves related to growth, e.g. investment; less free trade could induce more growth if trade and foreign direct investment (FDI) are substitutes and if it is combined with freedom for FDI; and perhaps some countries are able to act as price makers on the international market, using trade policy strategically, and it may be that they have higher growth rates.

4. See e.g. the survey provided in Berg and Krueger (2003). Rodriguez and Rodrik (2000) claim that the results in this literature are less trustworthy than has been claimed due to poor measures and methods; but Baldwin (2003) maintains that there are credible studies to the effect that openness is growth-enhancing *in combination with* a stable and nondiscriminatory exchange rate system, responsible fiscal and monetary policies and an absence of corruption.

accentuates the need to scrutinize the negative finding of Carlsson and Lundström (2002).

Along that line, the contribution of this paper is threefold: first, we use a new version of the EFI and conduct extensive sensitivity analysis to see if the negative result on trade openness holds; second, we decompose the index even further, in order to get more information on what, exactly, drives the result; and third, by using the EFI, we are able to control for the growth effects of other market-oriented policy changes that often take place at the same time as trade liberalization (and hence we avoid a methodological problem encountered by many other cross-country studies in this area, as pointed out by e.g. Baldwin, 2002, and Clemens and Williamson, 2002).

We run cross-country regressions, encompassing 78 countries over the period 1970–2000. The results indicate that the area "Freedom to exchange with foreigners" is, indeed, detrimental for growth. In this regard, we replicate the result of Carlsson and Lundström (2002), as in finding that the area "Legal structure and property rights" exerts a strongly positive influence. When decomposing the index further in the area "Freedom to exchange with foreigners," we find that one of its components, "Taxes on international trade," seems to be the decisive factor behind the result. That is, the higher these taxes, the higher the growth rate.

However, our sensitivity analysis reveals that the negative result for "Freedom to exchange with foreigners" is not robust to changes in the sample or the specification of the model. In fact, using Least Trimmed Squares to identify outliers and Reweighted Least Squares to perform estimations without the outliers (these robust estimators are explained in section 3.2), we get the result that "Freedom to exchange with foreigners" exerts a positive influence on growth! Likewise, looking at various subsamples of countries reveals that the negative effect primarily holds for some types (such as democratic and poor countries) but not for others. This should make one cautious in accepting the finding of a negative relationship.

2. The data

Our data set consists of averages of economic freedom measures (1970–1995) and macroeconomic variables (1975–2000) for 78 countries. The variables used are specified in Appendix.

The estimations are made on the basis of country averages of annual data for the time periods mentioned, except for Y75 and SCHOOL, which measure initial values, and except in the case of EFI data, which are only available at, and thus averaged over, five-year intervals. The use of levels instead of changes is consistent with endogenous growth theory, where certain policy variables are assumed to affect economic growth. Since institutional variables, such as the EFI, are likely to have a long-run influence on economic growth, we have chosen to work with a cross-section rather than with a panel of countries. The EFI spans only a period of 30 years with no more than seven observations for each country. This leaves little time-series variation, especially if we would have used ten- or fifteen-year averages to avoid problems of short-run dynamics; and of course any fixed-effects specification throws away the between-country variation.

The choice of explanatory variables is such as to include those that have generally been shown to be significantly and robustly related to growth (see e.g. Levine and Renelt, 1992 and Sala-i-Martin, 1997; cf. de Haan and Sturm, 2000, 2001). The EFI is added, in various ways, to investigate if it adds explanatory power, as we hypothesize it might.

In central respects, the choice of variables, as well as the model specifications, mirror the Carlsson and Lundström (2002) study. Unlike their study, our include data for the EFI from 1995 and data for the other variables for the period 1996–2000. Moreover, the Fraser Institute constantly tries to improve the quality of the EFI, and new parts have been added in the latest version.

3. The results

3.1 The regression results

In order to get a picture of what in the EFI that affects growth we regress real per capita GDP growth (ΔY_i) on the five areas that together make up the summary index. Our baseline specification is written

$$\Delta Y_i = \alpha + \beta_1 Y75_i + \beta_2 INV_i + \beta_3 SCHOOL_i + \Sigma_j \delta_j EFI_{ji} + \varepsilon_i, \tag{1}$$

where economic growth (ΔY) and the investment share of GDP (INV) are country averages between 1975 and 2000 and percentage of "secondary school complete" in the total population in 1975 (SCHOOL) is an initial value.[5] EFI_{ji} is area j (j=1,..., 5) of the EFI in country i averaged between 1970 and 1995 (we expect economic freedom to have a lagged effect on growth). To control for convergence, GDP per capita in 1975 (Y75) is also included.

We use the average GDP per capita between 1970 and 1974 (Y7074) and the average investment share of GDP between 1970 and 1974 (INV7074) as instruments for Y75 and INV. This is to ensure that β_1 is not biased due to measurement error and that β_2 is not overestimated due to endogeneity (as one can easily imagine that growth causes investment as well as the other way around).[6]

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5. Since the initial (1975) percentage of "secondary school complete" in the total population is predetermined, it enters as its own instrument. For empirical arguments on why a stock rather than a flow is preferable for this kind of human-capital proxy, see Gemmell (1996) and Pritchett (1996).

6. Cf. Barro and Sala-i-Martin (1995: 431) and Temple (1999: 129).

Table 1. Estimation with the five areas of the EFI

	Coefficient (std. error)	Variance inflation factor
EFI_1 Size of government	.0965 (.1258)	1.33
EFI_2 Legal structure and property rights	.8050** (.1341)	2.93
EFI_3 Sound money	.3720* (.1556)	2.16
EFI_4 Freedom to exchange with foreigners	-.4043* (.1727)	2.71
EFI_5 Regulations	.1179 (.2940)	1.97
$Y75^{IV}$	-.1403* (.0204)*	2.94
INV^{IV}	.0943 (.0586)	1.20
SCHOOL	.0364 (.0292)	2.11
Constant	-5.6037** (1.4988)	
R-squared	.58	
# obs.	78	
Condition number	4.2	

Note: The dependent variable is ΔY. The two variables with the superscript IV refer to instrumented variables with EFI_j, $j = 1,...,5$, SCHOOL, Y7074 and INV7074 as instruments. Huber-White robust standard errors are used. * indicates significance at the 5 percent and ** at the 1 percent level.

According to the estimates in Table 1, three of the five areas of the EFI have a statistically significant effect on growth. In particular, we reproduce Carlsson and Lundström's (2002) surprising negative effect of area 4 "Freedom to exchange with foreigners,"[7] as well as the positive effect of area 2 "Legal structure and property

7. It has been argued by Bhagwati (1999) that free trade and freedom for capital are two distinct phenomena with different effects on e.g. growth. Consequently, we ran a regression like the first specification in Table 4 but excluding components 4B (for reasons outlined below in connection with Table 5) and 4E "International capital market controls." The effect of this new variable on growth is negative but insignificant.

rights". Contrary to Carlsson and Lundström we also find that the positive effect of the third area "Sound money" attains statistical significance, but that the first area "Size of government" does not.[8,9] Table 1 also includes variance inflation factors and the condition number for the explanatory variables.[10] Neither of these indicators suggests that severe multicollinearity (presumably due to close resemblance of certain areas) is at hand.

The surprising finding that area 4 "Freedom to exchange with foreigners" reduces growth calls for further examination. A natural step is to disaggregate this area into its five components. Table 2 contains the estimation results from such a disaggregation, where component 4B "Regulatory trade barriers" is excluded since it is only available for 37 countries.

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8. We get very similar results if we instead use PPP-adjusted or chain-weighted growth rates. The most notable difference is that the negative effect of EFI_4 only attains statistical significance at the ten percent level with PPP-adjusted growth rates.

9. The effect of one variable, such as free trade, is not always manifested in the coefficient of the variable itself but through other variables that are themselves related to growth. One such candidate is investment. If we estimate the specification in Table 1 without investment, the coefficient for EFI_4 becomes less negative (-.27) and statistically insignificant. Thus free trade might promote growth through investment. The correlation coefficient between EFI_4 and INV is .29 and when regressing INV on EFI_4 and a constant, the coefficient for EFI_4 (1.28) is highly statistically significant. The same is true if we also include the other areas of the EFI in the regression.

10. Variance inflation factors are indicators of multicollinearity. As a rule of thumb a value greater than 10 indicates that the significance of the other variables is sensitive to the inclusion of the variable in question.

Table 2. Estimation with the components of area 4 of the EFI

	First specification		Second specification	
	Coefficient (std. error)	Variance inflation factor	Coefficient (std. error)	Variance inflation factor
EFI_1 Size of government	.0513 (.1531)	1.50	.1146 (.1186)	1.32
EFI_2 Legal structure and property rights	.7546** (.1342)	3.00	.8002** (.1357)	2.99
EFI_3 Sound money	.2801* (.1307)	2.03	.2709 (.1307)	2.00
EFI_{4A} Taxes on international trade	-.2172 (.1098)	2.67	-.2316* (.1090)	2.64
EFI_{4C} Actual size of trade sector compared to expected size	-.1368 (.1037)	1.63		
EFI_{4D} Difference between official exchange rate and black market rate	.0534 (.0806)	1.76		
EFI_{4E} International capital market controls	-.0040 (.0902)	2.21		
EFI_{4CDE}			-.0662 (.1309)	2.60
EFI_5 Regulations	.0515 (.2883)	1.97	.0263 (.2894)	1.96
$Y75^{IV}$	-.1405** (.0246)	3.88	-.1244** (.0246)	3.26
INV^{IV}	.1408* (.0614)	1.38	.1169* (.0566)	1.24
SCHOOL	.0435 (.0308)	2.13	.0458 (.0304)	2.12
Constant	-5.9795** (1.5218)		-5.8214** (1.4444)	
R-squared	.62		.59	
# obs.	78		78	
Condition number	5.09		4.6	

Note: The dependent variable is ΔY. The two variables with the superscript IV refer to instrumented variables with EFI_j, j = 1, 2, 3, 5, EFI_{4k}, k = A, C, D, E (in the first specification; in the second, C, D, and E are measured as a composite), SCHOOL, Y7074 and INV7074 as instruments. Huber-White robust standard errors are used. * indicates significance at the 5 percent and ** at the 1 percent level.

Focusing on the first specification in Table 2, we see that none of the four components in area 4 of the EFI turns out statistically significant; but component 4A "Taxes on

international trade" is very close (with a significance level of 5.2 %). The second specification, where the components C, D, and E of area 4 are put together into a composite measure, renders component 4A statistically significant. Hence, this variable appears to be behind the negative effect of free trade on growth: the higher the tariffs, the higher the growth rate (as economic freedom and tariffs are negatively related by definition). Furthermore, 4A is the only component that attains statistical significance if we include component 4A to 4E one at a time.[11] Table 2 also includes variance inflation factors and the condition number for the explanatory variables. Neither of these indicators suggests that severe multicollinearity is at hand.

3.2.   Sensitivity analysis

We carry out two types of sensitivity analysis in order to detect whether the EFI results are robust: a test of the sensitivity of the results to the specification of the model and some tests of the sensitivity of the results to the sample.

The first test uses the Extreme Bounds Analysis applied by Levine and Renelt (1992) and the less strict robustness test of Sala-i-Martin (1997). The former report an upper and a lower bound for parameter estimates based on a number of regressions with different combinations of regressors; a coefficient is defined to be robust if its two bounds have the same sign. The latter thinks this approach too demanding and instead argues in favor of analyzing the entire distribution of the parameter estimates, defining robustness as holding when the averaged 90 percent confidence interval of a coefficient does not include zero. Like Sturm and de Haan (2002a) we use an unweighted version of this test.[12] This sensitivity analysis includes 16 of the 22 variables that according to Sala-i-Martin (1997) appear to be "significant," as

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11. The estimates are available upon request.

12. See Sturm and de Haan (2002b) for a critique of Sala-i-Martin's weighted approach.

well as Life Expectancy. We have excluded the variables that are similar to the EFI variables. This gives rise to the following list of included variables:

1. Regional variables: Sub-Saharan Africa (dummy), Latin America (dummy), Absolute Latitude.

2. Political variables: Political Rights, Civil Liberties, Number of Revolutions and Coups, War dummy.

3. Religious variables: Fraction Buddhist, Fraction Muslim, Fraction Catholic, Fraction Protestant. (We have not been able to find Fraction Confucian.)

4. Types of investment: Equipment Investment, Non-Equipment Investment.

5. Primary sector production: Fraction of Primary Products in Total Exports, Fraction of GDP in Mining.

6. Former Spanish Colonies.

7. Life Expectancy.[13]

For each regression we add one of the 680 possible triplets of the above variables to equation (1). The results are reported in Table 3, with and without the Type of investment variables, which, when included, reduce the sample to almost half the size.

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13. For more detailed information on the variables included in the robustness analysis, see Berggren and Jordahl (2003).

Table 3. Significance shares for the EFI variables when altering the model specification

N=680					N=455				
	10 % sign	5 % sign	10 % sign	5 % sign		10 % sign	5 % sign	10 % sign	5 % sign
	%	%	#	#		%	%	#	#
EFI_1	3.971	.294	27	2	EFI_1	4.654	.440	21	2
EFI_2	95.294	87.794	648	597	EFI_2	99.560	98.462	453	448
EFI_3	58.824	34.412	400	234	EFI_3	84.176	51.429	383	234
EFI_4	40.441	23.088	275	157	EFI_4	51.868	40.230	236	183
EFI_5	.147	.000	1	0	EFI_5	1.099	.000	5	0

Note: The first five columns include equipment and non-equipment investment whereas the latter five do not. "N" refers to the number of regressions run.

EFI_4 "Freedom to exchange with foreigners" is not robustly related to growth. Even when excluding the Type of investment variables and using the 10 percent significance level, the share of statistically significant coefficients is a meager 52 percent. The only area of the EFI that passes the test (of significance at the 10 percent level in at least 90 percent of the regressions) is EFI_2 "Legal structure and property rights."[14] In their sensitivity analysis, Carlsson and Lundström (2002) only varied the included areas of the EFI.[15] We have shown that their claim that "Freedom to exchange with foreigners" is negatively and robustly related to growth does not appear to stand when other explanatory variables are incorporated in the sensitivity analysis.

The second type of test investigates whether only certain countries drive the results, i.e. if outliers that are not representative have a decisive influence on the estimated coefficients. First we use Least Trimmed Squares (LTS), the idea of which is to fit the majority of the data and, after that, to identify outliers as the cases with large

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14. According to the strict form of the Extreme Bounds Analysis, none of the five EFI areas is robustly related to growth.

15. We have performed this type of analysis as well (although it might be problematic to use a method which looks at the effect of eliminating variables thought to be of relevance for growth). When eliminating up to three of the EFI variables and re-estimating the model (14 times per EFI area), we only found EFI_2 to be robust at the 10 and 5 percent levels. EFI_4 only obtained a significance share of 21.4 % (5 % level) and 35.7 % (10 % level).

residuals (see Sturm and de Haan, 2002a).[16] After this identification, we use Reweighted Least Squares (RLS) for inference by giving outliers (defined as countries with a residual the absolute value of which is greater than 2.5 times the standard error of the LTS regression) the weight zero and other countries the weight one. This procedure concentrates on the observations that best approximate the estimated model. The advantage of LTS compared with single-case diagnostics like Cook's distance and DFITS is that it can handle cases with several jointly influential observations.

The estimates in Table 4 reveal that EFI_4 is *positively* correlated with growth when 24 outlying observations are excluded. The sign of EFI_3 (now negative) also changes with the exclusion. The estimates in Table 4 should of course not be seen as evidence of a positive relationship between free trade and growth, but at least they indicate that measurement errors (which are common in the national accounts of less developed countries) or parameter heterogeneity (which is likely in cross country regressions) might explain the negative coefficient for EFI_4 in Table 4. [17]

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16. We minimize the sum of the 44 smallest residuals.

17. The definition of outliers is of course arbitrary. If we instead include the 61 countries with a residual that is smaller than 4 times the standard error of the LTS regression, the coefficient for EFI_4 is positive but not statistically significant. The smallest number of countries that we can drop in this procedure and still get a positive coefficient is 14. To do away with the statistical significance of the negative coefficient for EFI_4 we only need to drop Egypt and the Democratic Republic of Congo.

Table 4. Least Trimmed/Reweighted Least Squares estimation with the five areas of the EFI

	Coefficient (std. error)
EFI$_1$ Size of government	.0845
	(.0585)
EFI$_2$ Legal structure and property rights	.4134**
	(.0719)
EFI$_3$ Sound money	-.4324**
	(.0590)
EFI$_4$ Freedom to exchange with foreigners	.2675**
	(.0695)
EFI$_5$ Regulations	.6949**
	(.1273)
Y75^{IV}	-.0546*
	(.0169)*
INV^{IV}	.2294**
	(.0257)
SCHOOL	.0231
	(.0125)
Constant	-9.0788**
	(.0731)
R-squared	.87
# obs	54

Note: The dependent variable is ΔY. The two variables with the superscript IV refer to instrumented variables with EFI$_j$, j = 1,...,5, SCHOOL, Y7074 and INV7074 as instruments. Huber-White robust standard errors are used. * indicates significance at the 5 percent and ** at the 1 percent level. The following 24 countries are given weight zero: Bangladesh, Bolivia, Chile, Democratic Republic of Congo, Egypt, India, Indonesia, Jamaica, Malta, Mauritius, New Zealand, Nicaragua, Pakistan, Papua New Guinea, South Africa, South Korea, Sri Lanka, Syria, Thailand, Tunisia, Turkey, United Arab Emirate, Venezuela, Zambia. All observations are used to construct the instruments in the first-stage regressions.

In addition, we have varied the sample manually in various ways, dividing the sample into different groups in order to see if the results hold only for countries with certain characteristics. Some of the divisions that have been undertaken, and the basic results, are the following:[18]

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18. All estimations are available on request.

1. Rich or poor: The negative effect of EFI_4 holds for poor countries (with Y75 less than the median) and is positive but not statistically significant for rich countries.

2. Democratic or non-democratic: The effect of EFI_4 is positive in less democratic countries, as measured by the variables Political Rights (not statistically significant) and Civil Liberties (statistically significant at the 10 percent level); and the effect is negative and statistically significant for more democratic countries. For variable definitions see Berggren and Jordahl (2003).

3. Continents and groups of countries: The negative result for EFI_4 holds when excluding Tiger economies in Asia (with a theoretical possibility of their being closed but fast-growing); there is a particularly strong negative effect of EFI_4 in Latin America; otherwise few interesting results are obtained.

4 Concluding remarks

It is widely believed that free trade is growth-promoting, and a number of studies confirm this result. However, the relatively new dataset that forms the Economic Freedom Index has been used to show the opposite result (Carlsson and Lundström, 2002). In using a newer version of the index, and hence partly new data, we likewise find that the area "Freedom to exchange with foreigners" is associated with slower growth. By decomposing the index even further, we can establish that the component "Taxes on international trade" seems to drive this result – the higher these taxes, the higher the growth.

However, performing a sensitivity analysis reveals that this negative result is not robust. A robustness test of the model specification reveals that "Freedom to exchange with foreigners" is significant in only 40 percent of the cases at the 5 percent significance level and in only 52 percent of the cases at the 10 percent level. Furthermore, the results are sensitive to the sample used. When using LTS to identify

outliers and RLS for inference, the variable turns out significant and *positive*. Likewise, dividing the sample of countries into different groups reveals that the negative result only holds for some types of countries whereas other types are characterized by a positive result. (Carlsson and Lundström, 2002, do not perform these kinds of tests.) The implication is that the negative result found in OLS and 2SLS regressions should be interpreted with great caution.

Now, it could be that cross-country regression studies do not use a methodology suitable to investigating the effect of free trade on growth, as Bhagwati and Srinivasan (2001) have argued at length. For example, even if there is a partial correlation between area 4 of the EFI and growth, the causality is unclear (cf. Dawson, 2003). So clearly, there is scope for more detailed, and various kinds of, studies of the free trade-growth relationship (as well as between other areas of the index and growth). In the paper, we have identified several actual and potential weaknesses of the tests thus far. Although we have tried to resolve a few of these problems, it is still imperative to be careful when offering policy advice. There is no robust and general relationship to the effect that less free trade raises growth rates.

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Appendix

Table A1. Variable specifications and descriptive statistics for the countries of the Table 4 regressions

Variable name	Variable definition	# obs	Mean	Std dev	Max value	Min value	Source
ΔY	Average annual percentage change in 1995 constant USD per capita, 1975–2000	78	1.284	2.018	6.160	-4.808	WDI
Y75	Initial (1975) real GDP per capita in 1000 constant 1995 USD.	78	5.969	8.484	37.520	.149	WDI
Y7074	Average real GDP per capita in 1000 constant 1995 USD, 1970–1974	78	5.813	8.892	44.165	.134	WDI
INV	Average annual gross capital formation, per cent of GDP, 1975–2000	78	22.520	5.382	39.177	10.768	WDI
INV7074	Average annual gross capital formation, per cent of GDP, 1970–1974	78	23.088	7.189	46.169	9.419	WDI
SCHOOL	Percentage of "secondary school complete" in the total population, 1975	78	7.609	8.534	49.100	.020	BL
EFI_1	Size of government: Expenditures, taxes, and enterprises, average 1970–1995	78	5.440	1.512	9.535	2.418	GL
EFI_2	Legal structure and security of property rights, average 1970–1995	78	5.091	1.619	8.410	2.023	GL
EFI_3	Access to sound money, average 1970–1995	78	6.311	1.702	9.580	1.795	GL
EFI_4	Freedom to exchange with foreigners, average 1970–1995	78	5.660	1.450	9.608	2.512	GL
EFI_5	Regulation of credit, labor, and business, average 1970–1995	78	5.445	.858	7.497	2.835	GL
EFI_{4A}	Taxes on international trade, average 1970–1995	78	5.813	2.252	9.900	.208	GL
EFI_{4B}	Regulatory trade barriers, average 1970–1995	37	6.691	1.624	9.300	3.330	GL
EFI_{4C}	Actual size of trade sector compared to expected size, average 1970–1995	78	5.041	2.064	10.000	.207	GL
EFI_{4D}	Difference between official exchange rate and black market rate, average 1970–1995	78	7.397	2.476	10.000	0	GL
EFI_{4E}	International capital market controls, average 1970–1995	78	2.874	2.627	9.885	0	GL
EFI_{4CDE}	$(EFI_{4C} + EFI_{4D} + EFI_{4E})/3$	78	5.104	1.700	9.569	1.012	GL

Note: WDI = World Bank (2001); BL = Barro and Lee dataset at <http://www.nber.org/pub/barro.lee>; GL = Gwartney and Lawson (2002) or <http://www.freetheworld.com>. All variables of the EFI range from 0 ("no economic freedom") to 10 ("full economic freedom"). The components of the EFI, as well as weighting schemes, have changed in the various editions that have been published.