The Contribution of Economic Freedom to World Economic Growth, 1980–99

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Since 1986, a group of researchers associated with the Fraser Institute have focused on the definition and measurement of an internationally comparable index of economic freedom (Easton and Walker 1992; Gwartney, Block, and Lawson 1996). This work has resulted in the development of a numerical index that now ranks 123 countries in terms of their degree of economic freedom, as measured by a composite of 38 indicators grouped in five major categories: size of government, legal structure, monetary and banking policy, international trade, and regulation (Gwartney and Lawson 2002). One important finding is that the degree of economic freedom, as measured by the Economic Freedom of the World (EFW) index, is highly correlated with both the level and the rate of growth of real per capita GDP (Table 1).

These comparisons, though striking, nonetheless suffer from two limitations: they are simple two-variable correlations, and they are average results for groupings of countries.

Analyzing the results for countries grouped in quintiles averages out much of the actual dispersion in the data, and ignoring the effect of other explanatory variables biases the results due to an "omitted variables" effect. The purpose of this study is to evaluate the incremental explanatory power of the EFW index in the context of more general models of economic growth. The period chosen for study is 1980–99, and the economic growth regressions are estimated for a sample of 106 countries.[1]

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[1]See the Appendix for data sources. The basic data set is available from the author (jhcole@ufm.edu.gt).

TABLE 1

ECONOMIC FREEDOM, INCOME PER CAPITA, AND ECONOMIC GROWTH

Countries Ranked by EFW Index	GDP per capita 2000 PPP (U.S.$)	Growth Rate of GDP per Capita, 1900–2000 (%)
Bottom quintile	2,556	–0.85
4th quintile	4,365	1.44
3rd quintile	6,235	1.13
2nd quintile	12,390	1.57
Top quintile	23,450	2.56

SOURCE: Gwartney and Lawson (2002a: 20, Exhibits 5 and 8).

Convergence and Economic Freedom

At first glance, the results in Table 1 seem to contradict at least some aspects of neoclassical growth models, since the high EFW countries are not only richer than low EFW countries but also grow faster, contrary to the "convergence" predictions of the standard models, which imply that high-income countries will tend to have lower rates of growth due to diminishing returns on physical capital (Solow 1956). However, these two effects are not necessarily mutually exclusive. In principle, both effects can hold because, as Barro and Sala-i-Martin have pointed out, the convergence effect is actually a ceteris paribus prediction (Barro and Sala-i-Martin 1992, Barro 1994, Sala-i-Martin 1996). What the neoclassical models predict is that, other things being equal, countries with higher initial income will have slower growth, and vice versa.

Therefore, a direct test of the existence of both effects would be to regress the growth rate of real per capita GDP against (1) the log of initial-year PPP-adjusted per capita GDP, (2) the EFW index, and (3) a set of additional explanatory variables, as suggested by some prior theoretical framework. The convergence effect predicts that the first variable should have a negative coefficient, and the interpretation of the regression is straightforward: Other things being equal, (1) if two countries have the same level of economic freedom, as measured by the EFW index, the country with the higher initial income will tend to have a lower growth rate due to the convergence effect; (2) if two countries start out with the same income level, the country with more economic freedom will tend to grow faster.

The usefulness of the EFW index as an explanatory variable for

economic growth can be evaluated by examining its performance under different model specifications. One possibility is to include EFW in a growth regression based on the augmented Solow growth model (Mankiw, Romer, and Weil 1992; Knight, Loayza, and Villanueva 1993). Models following this approach usually include initial income, investment share in GDP, a measure of population growth, and some measure of human capital. Another option is to include EFW in a simplified version of a model recently proposed by Gallup, Sachs, and Mellinger (1999), explaining per capita income growth in terms of the convergence effect and three geographic variables. Estimating the effect of EFW in the context of these two different models is quite a strong test of robustness for this variable, because it would be hard to imagine characterizations of the growth process that differ as much as these do. If it turns out that EFW is significant in both regressions, then one could conclude that economic freedom is indeed a significant factor in economic growth, regardless of one's basic theoretical framework.

Economic Freedom in a Neoclassical Growth Model

Regressions based on the neoclassical model are reported in Table 2 (Regressions 1 to 6). The first regression uses as explanatory variables only the variables in the basic model:

- LOGGDP80: log of PPP-adjusted per capita GDP in 1980;
- INV: investment share in GDP, average for 1980–99;
- FERTIL: total fertility rate, average for 1980–99, used as the measure of population growth;[2] and
- DSCH15: change in average years of schooling for the population aged 15 and over, 1980–95 (as measured by Barro and Lee 2001), used as the human capital variable.

This model performs rather well. These four variables explain 60.6 percent of the cross-country variation in economic growth over this period; all of the variables are significant and have the expected signs.

Regression 2 adds the average EFW index for each country (measured as the average of the values for 1980, 1985, 1990, and 1995).[3] Even though we lose five observations due to missing values, the

[2]Use of the fertility rate as the measure of population growth gives a better fit in the regressions, and its coefficient is also easier to interpret. However, none of the substantive conclusions are altered by using the population growth rate instead.

[3]The EFW index is a number ranging from 1 (low economic freedom) to 10 (high economic freedom).

TABLE 2

Regression Results: Determinants of Economic Growth, 1980–99

Dependent Variable: Average Annual Growth Rate, Real GDP per Capita								
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	14.604	13.061	11.752	11.662	11.669	13.797	4.666	1.604
	(5.559)	(5.189)	(3.739)	(4.953)	(4.996)	(6.506)	(1.147)	(0.408)
LOGGDP80	–1.433	–1.742	–1.77	–1.751	–1.752	–1.754	–0.449	–1.159
	(–5.831)	(–7.282)	(–5.748)	(–7.891)	(–8.007)	(–7.912)	(–1.374)	(–3.067)
INV	0.076	0.082	0.075	0.085	0.084			
	(3.035)	(2.902)	(2.613)	(3.077)	(3.288)			
INV*EFW						0.0139		
						(3.068)		
FERTIL	–1.203	–1.091	–0.999	–1.002	–1.002	–1.037		
	(–7.859)	(–7.369)	(–5.432)	(–7.203)	(–7.251)	(–7.608)		
DSCH15	0.531	0.568	0.555					
	(2.868)	(3.229)	(2.869)					
DMALESCH15				0.529	0.521	0.529		
				(2.394)	(3.649)	(3.681)		
DFEMSCH15				–0.013				
				(–0.050)				
EFW		0.621	0.789	0.76	0.761	0.423		1.245
		(4.319)	(4.602)	(5.331)	(5.490)	(2.222)		(7.007)
DEFW			0.478	0.46	0.461	0.458		0.715
			(3.378)	(3.570)	(3.616)	(3.566)		(3.955)

TROPICAR							−2.148	−2.333
							(−3.767)	(−4.132)
POP100KM							2.095	1.293
							(3.768)	(2.462)
LOGDIST							−0.007	0.217
							(−0.033)	(1.047)
R-Squared	0.606	0.695	0.741	0.746	0.746	0.742	0.239	0.543
N	90	85	85	85	85	85	96	87
White test (chi-square)	5.03	24.928	40.653	43.281	38.83	38.265	27.753	48.996
D.f. for White test	14	20	27	35	27	27	14	27
Prob-value	0.985	0.204	0.044	0.159	0.066	0.074	0.015	0.006

Note: All of the regressions were estimated by OLS. Numbers in parentheses are t-values of the estimated coefficients. For regressions 3, 7, and 8, t-values were estimated using the White (1980) correction.

results are still quite strong. The coefficient for EFW is positive and significant, and the explanatory power increases to 69.5 percent. The coefficients for the other variables are significant and quite similar to the previous results.

Regression 3 adds DEFW, the change in the EFW index from 1980 to 1995. That variable also has a positive and significant coefficient, and increases the explanatory power to 74.1 percent, which suggests that the effect of economic freedom on economic growth depends not only on the absolute *level* of the EFW index during any given period but also on the direction (and magnitude) of the *change* in the index over that period.

Regression 4 disaggregates DSCH15 into its male (DMALESCH15) and female (DFEMSCH15) components.[4] The results suggest that it is the male component of the schooling variable that really counts in terms of economic growth.[5] Regression 5 drops DFEMSCH15. All variables are significant (including EFW and DEFW), and the results are essentially similar to those in Regression 3.

Finally, Regression 6 replaces INV with an interaction term between INV and EFW (INV*EFW). In this regression, the effect of changes in the investment rate is conditional on the value of EFW: each one point increase in the EFW index increases the impact of a one point increase in INV by about 0.014 percentage points. Thus, other things being equal, if the investment rates in two countries differ by 10 points (say, 10 and 20 percent of GDP), on average their annual growth rates would differ by about 1.4 percentage points if EFW = 10 (very high economic freedom), but only by about 0.14 percentage points if EFW = 1 (very low economic freedom). Notice that EFW has an independent effect of its own in this regression, which implies that not all of its effect occurs through effects on investment productivity.[6] The coefficients for the other variables are

[4]Figures on male schooling for 1980 and 1995 were derived from data on total and female schooling using the formula MALESCH = 2*SCH-FEMSCH.

[5]This confirms findings of other researchers in this regard (e.g., Barro 2001), and may be due to the fact that in most countries men still account for the larger share of the labor force. Even with current low female labor participation rates, however, this result does not imply that female education has no effect at all on economic growth, since there is an important indirect effect due to the impact of female education on fertility levels.

[6]The coefficient for EFW in Regression 6 is lower than in Regression 5, but these coefficients cannot be compared directly because in Regression 6 the effect of a unit change in EFW is conditional on INV, and now equals 0.423 + 0.0139*INV. The mean value for INV is 21.1 percent of GDP for the 85 countries in the sample for Regressions 5 and 6 (for the 106 country sample it is 21.5 percent). For this value of INV, the effect of a unit change in EFW would be 0.716, which is actually quite close to the estimated coefficient for EFW in Regression 5.

quite similar to those in Regression 5, and the explanatory power is practically the same in both regressions, so there is not much reason for preferring one over the other on purely statistical grounds, although Regression 6 seems theoretically more appealing because it allows for changes in the productivity of investment as a function of the EFW index. The results imply that any given level of investment will have a higher growth impact in countries with greater degrees of economic freedom.[7]

Geography, Economic Freedom, and Growth

We can conclude, from Regressions 1 to 6, that economic freedom, as measured by the EFW index, adds significantly to the explanatory power of a neoclassical growth model.[8] To test the robustness of this finding with respect to changes in model specification, one needs to estimate the effect of economic freedom in the context of a growth regression based on a totally different approach.

A series of recent studies directed by Jeffrey Sachs have focused on the relationship between geography and economic development (Gallup, Sachs, and Mellinger 1999; Sachs 2000). The motivation for these studies is based on two empirical observations: (1) Countries located in tropical regions of the world tend to be poor, whereas countries in temperate zones tend to be wealthier—a comparison of GDP per capita in countries grouped according to geographic latitude illustrates this tendency quite graphically (Sachs 2000: Fig. 2); and (2) countries with easy access to maritime transportation tend to be wealthier than landlocked countries. These two tendencies are mutually reinforcing: landlocked *and* tropical countries tend to be the poorest of all.

Although these studies consider a very large number of different variables, we will concentrate here on the three main location-related variables used in Gallup, Sachs, and Mellinger (1999):

- TROPICAR: proportion (0 to 1) of a country's territory located in the geographic tropics;[9]

[7]This issue is also explored, using a slightly different methodology, in a working paper by Gwartney, Holcombe, and Lawson (2003).

[8]Easton and Walker (1997), working with levels of income, and Dawson (1998), working with rates of growth, applied an earlier version of the EFW index to extend the results of Mankiw, Romer, and Weil (1992). Both studies confirmed that addition of an economic freedom measure increases the explanatory power of the neoclassical model.

[9]Tropical regions are defined as areas located between 23.5 degrees of latitude North (Tropic of Cancer) and 23.5 degrees of latitude South (Tropic of Capricorn).

- POP100KM: proportion (0 to 1) of the country's population living within 100 kilometers of the seacoast; and
- LOGDIST: log of minimum distance of the country to one of three core areas of the world economy (defined as NewYork, Rotterdam, or Tokyo).

The Gallup, Sachs, and Mellinger study found that these three variables explained a large share of the cross-country variation in real income *levels* in 1950, 1990, and 1995. In addition, it was found that the effect of these variables increased through time, implying a geographic effect on *rates of growth* as well.

To test for a geographic effect on growth in the 1980–99 sample period, we first estimate Regression 7, a growth regression based on these three variables, plus initial income (to allow for a convergence effect). Both TROPICAR and POP100KM are significant and have the expected signs, but LOGDIST is not significant. The convergence effect, though negative, as expected, is only marginally significant. Overall explanatory power for this regression is quite low (23.9 percent).

Adding EFW and DEFW to this model (Regression 8) substantially increases its explanatory power (54.3 percent). All of the variables are significant except for LOGDIST, with the expected signs, and it is noteworthy that in this model the estimated impact of economic freedom on economic growth is even stronger than in the neoclassical model.

Conclusion

The purpose of this study is not to compare different theories of economic growth, but to evaluate the impact of economic freedom on economic growth under alternative theoretical frameworks. The particular measure of economic freedom employed—the EFW index—was found to be quite robust with respect to major changes in model specification. We conclude that economic freedom is a significant factor in economic growth, regardless of the basic theoretical framework.

This conclusion has important implications because the EFW index stresses a broad set of policy variables that are known to affect economic efficiency: inflation rates, taxes, public spending, government enterprises, state-directed investment, tariff protection, nontariff trade barriers, price controls, and distortions in labor and credit markets. The negative effects of these policy-induced distortions are almost surely mutually reinforcing and, in any case, tend to be highly

correlated (countries with bad policies tend to be consistently bad along many policy dimensions), so it is hard to sort out their separate effects. It seems clear, however, that consistently bad policies have a major negative impact on economic growth, while improvements in the policy mix can be significantly growth enhancing. The EFW index provides, in effect, a report card on a country's overall economic policy (and, implicitly, suggestions on how to get a better grade). It is, moreover, a report card with considerable predictive power. Policy analysts would be well advised to keep an eye on this index in the future.

Appendix: Data Sources

The following data sources were used in this study: (1) Economic and population variables: *World Development Indicators*, 2001 (CD-ROM version). This source reports data for 207 countries, but coverage for some of them is rather limited. For this study, the basic sample is restricted to countries for which figures are available on real GDP per capita for the years 1980 and 1999 (thus allowing calculation of a rate of growth of real per capita GDP over that sample period). This sample is reduced further to 106 countries for which full data are available on variables required for Regressions 1 and 7. (2) Educational attainment: Barro and Lee (2001). Their data set can be downloaded from www2.cid.Harvard.edu/ciddata/barrolee/Appendix.xls. (3) Economic Freedom of the World Index: Gwartney and Lawson (2002b). Data set provided by Robert Lawson. (4) Geographic variables: Gallup, Sachs, and Mellinger (1999). Their data set can be downloaded from www2.cid.harvard.edu/ciddata/geodata.csv.

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