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# Economic freedom and economic growth: Does specification make a difference?

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**Abstract**

In this paper we apply meta-analytic techniques to the literature on the impact of economic freedom on economic growth and find an overall positive direct association between economic freedom and economic growth. A positive indirect effect of economic freedom on economic growth through the stimulation of physical capital is also identified. However, the literature is affected by specification bias with respect to controls for physical capital. The omission of physical capital results in larger estimates of the economic freedom–economic growth association. Further, the use of panel data leads to smaller estimates of the impact of economic freedom on economic growth. The meta-analysis is confirmed by primary cross-sectional and panel data analysis of 82 countries for the period 1970–1999.


*JEL classification:* C4; H0; O0; O4
*Keywords:* Economic freedom; Economic growth; Investment; Specification bias; Meta-regression analysis

## 1. Introduction

One of the foremost areas of research in the past decade has been the impact of institutions on economic performance. Numerous researchers have explored the links between democracy and economic growth (see Sirowy and Inkeles, 1990; Przeworski and

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Limongi, 1993). A smaller group of researchers has investigated the important links between economic freedom and growth. Economists agree that economic freedom, along with political freedom and civil liberties, is one of the pillars of a country's institutional structure, and following from this, institutions are amongst the prominent factors in explaining cross-country differences in living standards. For example, Easterly and Levine (1997) note that conventional factors, such as physical and human capital and labor supply, do not explain completely growth in Africa and instead emphasize institutional explanations. However, researchers in general are yet to understand completely the precise links from institutions to growth and welfare, and the channels through which they function. In the wake of the challenges of economic development, we need a solid understanding of institutions, of which economic freedom is an integral part.

Although economists have for a very long time been interested in issues such as property rights, economic freedom and free markets, the *empirical* literature on economic freedom and growth is relatively recent. There were only few studies until the late 1990s, after which there has been an explosion of interest on the issue, with 28 empirical studies published in 2000–2003. There have been several reviews of the economic freedom–economic growth literature. Hanke and Walters (1997) survey the measures of economic freedom that were available until 1997. The Editorial Introduction by de Haan (2003) to the special issue of *European Journal of Political Economy* on Economic Freedom critically reviews 12 studies on economic freedom and economic growth. Berggren (2003) also reviews some of the literature. The existing reviews, however, are all qualitative. Qualitative reviews that critically appraise the data, measures, methodologies and results, are vulnerable to what Stanley (2001) calls "casual methodological speculation", or the subjective interpretation of evidence. Multi-dimensional associations (such as relating economic growth and its drivers) require formal hypotheses testing, which cannot be undertaken using traditional qualitative reviews.

A single study can never resolve theoretical debates, nor alone can it offer conclusive empirical evidence on research questions. It is necessary to draw inferences from the available pool of empirical studies. This paper has two objectives. First, the paper offers the first quantitative review (meta-analysis) of the empirical economic freedom–economic growth literature. The paper seeks to identify the direction and to quantify the strength of the association between economic freedom and economic growth using the results from the available published literature. Second, studies differ with respect to data, specification and measurement. A meta-regression analysis is employed to trace the impact of the data and specification differences on the estimated relationship between economic freedom and economic growth. This analysis is supported by primary data analysis of 82 countries for the period 1970–1999, using a Solow growth model.

Meta-analytic techniques have gained wide appeal and use in the medical, biological and behavioural sciences, and are being adopted in economics (see Stanley, 2001). The principal aim of these techniques is to dissect a literature, using statistical procedures and econometric techniques to quantify key relationships. As such, meta-analysis provides a quantitative synthesis of the empirical findings from the available literature (Stanley, 2001; Hunter and Schmidt, 2004).

Section 2 of the paper discusses the studies (and hence data) included in the meta-analysis. The core of the paper is Sections 3 and 4. Section 3 presents the meta-analysis

results, and Section 4 uses meta-regression analysis to explore the sensitivity of published findings to specification and data differences. In Section 5 some of the meta-regression analysis results are tested by estimating a Solow growth model. Section 6 concludes the paper.

## 2. Data used in the meta-analysis

The approach adopted in this paper is to identify and quantify patterns, to draw inferences from the available studies, and to detect possible regularities in the association between economic freedom and economic growth. Empirical researchers try to understand cross-country growth by using data on economic growth and variables such as investment and human capital. In meta-analysis, the data generating process is the publication of research results. The published studies report a relationship between economic freedom and growth (such as a partial correlation) by using different data sets, specifications and estimation techniques. Thus, meta-analysis of the research results (such as elasticities and partial correlations) derived from these empirical studies can be seen as the statistical analysis counterpart of the primary data analysis.

A quantitative review of a literature begins with the collection of data derived from the available pool of empirical studies. Estimates are collected from these studies and then descriptive statistics are calculated to summarise the literature. A range of meta-analysis statistical techniques are then applied in order to identify patterns, as well as to investigate the impact of data, specification and measurement differences.

In our case, a comprehensive computer search of several databases was conducted, including Econlit, to identify empirical studies that relate to economic freedom. Several studies did not report the necessary information, and hence, were excluded from the subsequent analysis. Excluded also were studies that explored the impact of economic freedom on economic development (such as Esposto and Zaleski, 1999) or income inequality (Grubel, 1998). These are incompatible with the impact of economic freedom on economic growth studies.

From the available studies that have investigated empirically the links between economic freedom and economic growth, we are left with 52 studies that provided the necessary estimates of the impact of economic freedom on economic growth. This is the whole population of studies that is currently available.[1] These studies all use a measure of economic growth as the dependent variable and a measure of economic freedom as part of a set of explanatory variables. The report of the Heritage Foundation (2004 p. 50) describes economic freedom as:

> *. . .the absence of government coercion or constraint on the production, distribution, or consumption of goods and services beyond the extent necessary for citizens to protect and maintain liberty itself.*

[1] This literature is moving so fast that we have no doubt that a new meta-analysis with a wider set of studies will be necessary in the future. It would be interesting to compare the results of a subsequent meta-analysis with the ones presented in this paper.

More specifically, freedom of personal choice, freedom of exchange, freedom to compete, and protection of persons and private property are regarded as the central elements to the concept of economic freedom (Gwartney and Lawson, 2003). There have been basically four sets of measures of economic freedom: i) the Fraser Institute; ii) the Heritage Foundation; iii) Freedom House; and iv) Scully and Slottje (1991). The first two measures have been produced on a continuous basis. These measures attempt to quantify: "a continuum of unwritten taboos, customs and traditions at one end and constitutions and laws governing economics and politics at the other" (Aron, 2000, p. 103). For the most part, researchers use the Fraser Institute–Gwartney et al. (1996, 2000) and Gwartney and Lawson (2003)[2] measure in growth studies, as it is the most comprehensive in terms of time span. Of the 52 studies, 33 use the Fraser Institute's measure of economic freedom.

The 52 empirical studies all used regression analysis and reported coefficients, standard errors or *t*-statistics (or in some cases a Chi-square or *F*-test statistics). We use these statistics to calculate the partial correlations that are used in our subsequent analysis.[3] Within these 52 studies, we identified also the estimates of the impact of economic freedom on investment. The 52 studies also include the studies that use some measure of property rights (e.g. Gould and Gruben, 1996). Property rights are an integral component of economic freedom and hence studies that use a measure of property rights can consistently be included in the analysis.[4]

The partial correlation is our preferred measure of the impact of economic freedom. It measures the association between economic freedom and economic growth, after controlling for other determinants of economic growth.[5] The partial correlation is a *standardised* measure of the association between economic freedom and economic growth. The partial correlation is independent of the numerical values of the underlying variables. Hence, the partial correlation for one study can be compared directly with the partial correlation from another study. From the 52 studies we derive three different datasets. First, we can compile a database from those studies that used an *aggregate* measure of economic freedom and are deemed to be statistically independent. A study can be regarded as statistically independent in this context if it uses the same dataset as a previous study but involves different authors, or if the same authors use different datasets (see Hunter and Schmidt, 2004 for details). Accordingly, the studies by Ali and Crain (2001, 2002) are averaged so that only one estimate is derived from them. The same applies to de Haan and Sturm (2000) and Sturm and de Haan (2001). We consider the

[2] The efforts to build a measure by the Fraser Institute started in the 1980s. Over time, the Institute provided measures by several affiliates, the culmination of which was achieved by the Gwartney et al. (1996) report.

[3] The partial correlations were calculated mainly from the reported *t*-statistics, see Greene (2002). In a small number of cases, authors do not report a *t*-statistic, but do report a different test of statistical significance, such as a Chi-square test. These can also be converted into partial correlations (see Hedges and Olkin, 1985).

[4] We do not include studies that look at some particular aspect of economic freedom with a different focus, such as black market premium, share of government expenditure in GDP (fiscal policy), share of trade in GDP (openness) and other governance indicators, as these are also subjects of different literatures the analysis of which is beyond the scope of this paper.

[5] For this reason alone partial correlations are preferred to simple correlations. Partial correlations are popular in the empirical growth literature (see Barro, 1991, 1999). Hence, the partial correlations reported in Tables 2 and 4 can be compared to those, for example, associated with democracy and economic growth.

studies on property rights and growth as studies using a disaggregated measure of economic freedom. This leaves us with 45 statistically independent studies that use an aggregate measure of economic freedom.[6] We compiled one estimate from each of these studies (hence the number of observations is 45), using an author's preferred estimate, or calculating an average in cases where several estimates where provided.

Table 1 lists the one study–one estimate dataset (based on the 45 studies), together with the author's name, the publication date, the sample size, the average *t*-statistic[7] and the associated average partial correlation between economic freedom and economic growth.[8]

Some studies report several estimates of the impact of economic freedom. For example, Wu and Davis (1999) report separate estimates for the OECD, developing countries, and all countries combined. Other studies use different aggregate measures of economic freedom. These estimates form our second dataset of 68 observations (denoted as the medium dataset). This dataset includes estimates for all nations grouped together, as well as subsamples of countries and estimates from different aggregate measures of economic freedom.

The third dataset involves 148 observations, which includes all the estimates contained in the medium database, as well as estimates using disaggregate measures of economic freedom reported in papers that use disaggregate measures (such as Ayal and Karras, 1998; Carlsson and Lundstrom, 2002; Heckelman, 2000; Heckelman and Stroup, 2000a,b). These are studies, for example, that use some of the components of the Fraser Institute's measure of economic freedom. This dataset (denoted as the full dataset) also includes results from the studies that investigate the impact of property rights on growth.[9]

The use of these different datasets enables sensitivity analysis of the meta-analysis. However, we shall show that it makes little difference to the results from the meta-analysis which dataset is used.[10]

All the studies listed in Table 1 attempt to measure the impact of economic freedom on economic growth. The study by Gounder (2002) is a single country study (Fiji), while the study by Karabegovic et al. (2003) looks at two countries (USA and Canada). These are not incompatible with the majority of studies that look at a large number of countries. Both groups of studies explore the association between economic freedom and economic growth. They simply differ in terms of the data used (number of countries covered). Whether differences in data lead to different results is testable. In fact, when we remove the Gounder (2002) and Karabegovic et al. (2003) studies, the results remain unchanged.

The study by Gould and Gruben (1996) uses patent protection data (a measure of protection of private property). The study by Chong and Calderon (2000) uses data from

[6] Taken together, these 45 studies use 6416 observations.

[7] That is, an average *t*-statistic from studies that reported more than one usable *t*-statistic. Not all reported estimates are used, as many of the estimated regressions are reported purely for the sake of sensitivity.

[8] Average in this context means the average relating to estimates reported in a primary study that uses an aggregate measure of economic freedom.

[9] In addition to the studies listed in Table 1, the full dataset includes estimates from Ayal and Karras (1998), Chong and Calderon (2000), Feld and Voigt (2003), Gould and Gruben (1996) and Leblang (1996).

[10] Other groupings are possible, but the results are robust to the grouping. For example, the one study–one sample database can be extended to include also those studies that report a single estimate that involves a disaggregate measure.

Table 1
Estimates of the impact of economic freedom on economic growth (aggregate measures of economic freedom)

| Author(s) | Sample size | Average *t*-statistic | Average partial correlation |
|---|---|---|---|
| Abrams and Lewis (1995) | 87 | 3.20 | 0.35* |
| Adkins et al. (2002) | 292 | 1.05 | 0.06 |
| Ali (2003) | 73 | 2.70 | 0.32* |
| Ali and Crain (2001, 2002) | 92 | 1.98 | 0.21* |
| Assane and Grammy (2003) | 86 | 5.23 | 0.51* |
| Bengoa and Sanchez-Robles (2003) | 108 | 2.29 | 0.22* |
| Berggren and Jordahl (2005) | 81 | 4.87 | 0.49* |
| Carlsson and Lundstrom (2002) | 74 | 5.22 | 0.53* |
| Cole (2003) | 85 | 4.32 | 0.44* |
| Comeau (2003a) | 82 | 2.49 | 0.29* |
| Dawson (1998) | 237 | 1.97 | 0.13* |
| Dawson (2003) | 262 | n.a. | 0.12* |
| de Haan and Siermann (1998) | 114 | 2.86 | 0.26* |
| de Vanssay and Spindler (1994) | 100 | 7.06 | 0.59* |
| de Vanssay and Spindler (1996) | 109 | 1.94 | 0.19* |
| Easton and Walker (1997) | 57 | 3.54 | 0.44* |
| Farr et al. (1998) | 144 | 1.79 | 0.11* |
| Fidrmuc (2003) | 275 | 2.12 | 0.13* |
| Goldsmith (1995) | 59 | 3.04 | 0.38* |
| Goldsmith (1997) | 70 | 3.30 | 0.37* |
| Gounder (2002) | 29 | 2.09 | 0.39* |
| Grammy and Assane (1996) | 98 | 2.00 | 0.20* |
| Gwartney et al. (1999) | 82 | 2.43 | 0.29* |
| Hanke and Walters (1997) | 91 | 7.12 | 0.61* |
| Hanson (2003) | 100 | 8.74 | 0.66* |
| Heckelman (2000) | 188 | n.a. | 0.15* |
| Heckelman and Stroup (2000a,b) | 49 | 6.28 | 0.68* |
| Islam (1996) | 94 | 2.45 | 0.25* |
| Johnson and Lenartowicz (1998) | 38 | 6.01 | 0.71* |
| Karabegovic et al. (2003) | 420 | 18.41 | 0.67* |
| Lall et al. (2002) | 110 | 12.51 | 0.78* |
| Leschke (2000) | 80 | 3.37 | 0.37* |
| Nelson and Singh (1998) | 167 | 2.28 | 0.18* |
| Norton (2003) | 94 | 4.26 | 0.42* |
| Park and Ginarte (1997) | 60 | 2.43 | 0.32* |
| Pitlik (2002) | 73 | 2.75 | 0.34* |
| Ram (2000) | 62 | 0.93 | 0.13 |
| Scully (1988) | 115 | 3.01 | 0.27* |
| Scully (2002) | 86 | 1.87 | 0.20* |
| Spindler (1991) | 140 | 1.40 | 0.12 |
| Sturm and de Haan; de Haan and Sturm (2001, 2000) | 80 | 2.98 | 0.33* |
| Sturm et al. (2002) | 49 | −0.08 | −0.01 |
| Torstensson (1994) | 67 | 2.55 | 0.32* |
| Weede and Kampf (2002) | 63 | 0.98 | 0.13 |
| Wu and Davis (1999) | 1380 | 2.57 | 0.07* |

*Statistically significant at least at the 10% level; n.a. used Chi-square or *F*-test.

the Business Environmental Risk Intelligence (BERI), and provides separate estimates relating to property rights. As mentioned above, these studies are included. However, other studies that also use the BERI and data from the International Credit Rating Group (ICRG) are not included in this study if their focus was not related to economic freedom nor property rights. For example, Mauro (1995) explores the impact of corruption on economic growth. While the degree of corruption can be an important impediment to economic freedom, we do not include studies that have looked specifically at corruption and economic growth. Hence, we exclude the studies like Mauro (1995) and Mo (2001). Similarly, we exclude the studies by Knack and Keefer (1995) and Keefer and Knack (1997).

## 3. Meta-analysis of economic freedom

The meta-analysis involved exploring both direct and indirect effects of economic freedom on economic growth.

### 3.1. Direct growth effects

Table 2 presents the unweighted average, weighted average and 95% confidence intervals of partial correlations for the three different datasets and for four different groups of studies.[11] The unweighted mean is simply the average of partial correlations reported in the literature. However, since studies vary with respect to sample size, it is customary in meta-analysis to calculate a weighted average, with the weights being the study's sample size (see Doucouliagos and Laroche, 2003 and Hunter and Schmidt, 2004), or some other measure of precision.[12] Studies that use larger samples should, *ceteris paribus*, report more precise estimates, and hence, should be assigned greater weight. Column 2 presents the results for all studies, while column 3 presents the results for what we consider to be the best practice group of studies. The best practice group of studies consists of 20 studies that use a production function framework, controlling for the effects of *both* physical and human capital on economic growth. Levine and Renelt (1992) note that among nearly 50 variables considered for growth regressions, physical capital is one of the most robust determinants of growth. Additionally, Barro (1991) and Mankiw et al. (1992) have documented that human capital is overly suggestive in

[11] Correlations are not normally distributed. Hence, we follow convention and apply the Fisher $z$-transformation, which effectively transforms correlations into a normally distributed variable $z$ (Lipsey and Wilson, 2000). This enables the construction of standard confidence intervals. In the meta-regression analysis we use the uncorrected partial correlations as we wish to explore the heterogeneity of results.

[12] Doucouliagos and Laroche (2003) recommend using citation counts or journal impact factors as an alternative set of weights. This is an indicator of the influence and importance the profession has attached to each study, independently of sample size or precision. The citation counts can be derived from the Social Science Citation Index (SSCI). However, this approach is not valid for this dataset, as nearly 60% of the studies have received no citations, at least in part because many of the studies are relatively new. Moreover, some influential journals, such as the *European Journal of Political Economy* are not yet listed in the SSCI. Hence, the use of citations is likely to lead to distortions in the quantitative synthesis for the economic freedom–economic growth literature.

Table 2
Meta-analysis of partial correlations of economic freedom and economic growth

| Measure | All economic freedom studies (2) | Best practice economic freedom studies (3) | All studies using Fraser Institute measure (4) | Best practice economic freedom studies using Fraser Institute measure (5) |
|---|---|---|---|---|
| *One study-one sample dataset* | | | | |
| Unweighted average partial correlation | +0.36 (+0.29 to +0.42) ($N$=45) | +0.31 (+0.24 to +0.39) ($N$=20) | +0.37 (+0.27 to +0.46) ($N$=32) | +0.28 (+0.20 to +0.35) ($N$=14) |
| Sample size weighted average partial correlation | +0.28 (+0.18 to +0.42) ($N$=45) | +0.26 (+0.19 to +0.36) ($N$=20) | +0.23 (+0.15 to +0.39) ($N$=32) | +0.23 (+0.15 to +0.34) ($N$=14) |
| *Medium dataset* | | | | |
| Unweighted average partial correlation | +0.40 (+0.33 to +0.47) ($N$=68) | +0.36 (+0.28 to +0.46) ($N$=29) | +0.34 (+0.27 to +0.42) ($N$=45) | +0.33 (+0.25 to +0.41) ($N$=20) |
| Sample size weighted average partial correlation | +0.29 (+0.20 to +0.41) ($N$=68) | +0.29 (+0.21 to +0.39) ($N$=29) | +0.21 (+0.15 to +0.33) ($N$=45) | +0.27 (+0.19 to +0.39) ($N$=20) |
| *Large dataset* | | | | |
| Unweighted average partial correlation | +0.28 (+0.23 to +0.32) ($N$=148) | +0.27 (+0.20 to +0.34) ($N$=48) | +0.26 (+0.21 to +0.32) ($N$=98) | +0.28 (+0.21 to +0.35) ($N$=29) |
| Sample size weighted average partial correlation | +0.23 (+0.18 to +0.29) ($N$=148) | +0.22 (+0.17 to +0.30) ($N$=48) | +0.20 (+0.15 to +0.26) ($N$=98) | +0.23 (+0.17 to +0.32) ($N$=29) |

Each cell reports separate meta-analysis. First set of brackets reports 95% bootstrap confidence intervals.
$N$=number of estimates (population size) included in meta-analysis.

explaining growth. Column 4 presents the results for only those studies that use the Fraser Institute's measure of economic freedom. The final column of Table 2 reports the meta-analysis of only those best practice studies that use the Fraser Institute's measure of economic freedom.

As can be seen from Table 2, in all cases the weighted and unweighted average partial correlations are moderately positive. Importantly the 95% confidence intervals do not contain zero, and hence, we can conclude that the unweighted and weighted average partial correlations are statistically significantly different from zero.[13] The confidence intervals were constructed using bootstrapping methods. Bootstrapping was undertaken using 1000 iterations (with replacement) from which the distribution of economic freedom–economic growth partial correlations was generated. The percentile method was used to construct bootstrap confidence intervals (see Efron and Tibshirani, 1993). That is, the lower and upper 2.5% of the values of the generated distribution were used to construct the 95% confidence intervals. The bootstrap confidence intervals so created are appropriate in that they are centred on the observed data.

A notable feature in Table 2 is that studies that use the Fraser Institute's measure of economic freedom (column 4) tend to report slightly lower weighted partial correlations between economic freedom and economic growth as compared to studies that do not

[13] Note again that the data generated by the population of studies are partial correlations, and for a given population, these intervals imply the upper and the lower bounds of the economic freedom–economic growth relationship.

use this index (column 2). However, the difference is not statistically significant. That is, the measure of economic freedom does not appear to drive the results—*economic freedom has a robust positive effect on economic growth regardless of how it is measured.*[14] We return to this issue in Section 4 and explore it formally within a multivariate analysis context.

If the Fraser Institute measure of economic freedom is deemed to be the best measure and a production function is the best specification, then the last column of Table 2 offers the best estimate of the economic freedom–economic growth association. The average partial correlation of +0.23 indicates a moderate positive association that is both of statistical, as well as economic significance.

### 3.2. Indirect effects—physical capital

An important area of research in the empirical economic growth literature is the investigation of channels through which institutional arrangements influence growth. For example, researchers have explored the direct impact of democracy on growth, as well as the indirect effects of democracy on growth through channels such as human capital formation, investment, political stability, and income inequality. Factor accumulation is equivalently important as factor productivity, especially for developing countries that lack solid infrastructure for production. Economic freedom can have a direct impact on economic growth, and it may also have an indirect effect through, for example, its impact on human and physical capital investment and political stability.

Unfortunately, there have been few investigations of channels within the economic freedom literature. The most widely explored channel has been the impact of economic freedom on physical capital.[15] Table 3 lists the ten studies that have explored the links between economic freedom and investment.

The meta-analysis of the partial correlations of economic freedom and physical capital is presented in row two of Table 4 (the first row repeats the key results with respect to aggregate measures of economic freedom). Economic freedom has a positive and statistically significant impact on physical capital formation. Physical capital is one of the few variables which has been associated with a clear positive impact on economic growth (see, for example, Levine and Renelt, 1992). Hence, it is possible to infer that economic freedom works through physical capital to indirectly stimulate economic growth, in addition to its direct effect on economic growth. These associations are illustrated in Fig. 1.

Also listed in Table 4 are the average partial correlation between human capital, physical capital, democracy and economic growth, derived from those studies that included human and physical capital and democracy in their growth equation. These partial correlations enable comparisons to be made of the relative contributions to growth.

[14] Doucouliagos (2005) shows that publication bias exists in the economic freedom literature, making it difficult to quantify the real magnitude of the positive association between economic freedom and economic growth.

[15] A small group of studies has explored the impact of economic freedom on human capital formation. See, for example, Park and Ginarte (1997), Dawson (1998) and Norton (2003).

Table 3
Estimates of the impact of economic freedom on investment

| Author(s) | Sample size | Partial correlation |
|---|---|---|
| Ali and Crain (2001, 2002) | 93 | +0.19* |
| Ayal and Karras (1998) | 58 | +0.26* |
| Bengoa and Sanchez-Robles (2003) | 108 | +0.31* |
| Comeau (2003b) | 82 | +0.08 |
| Dawson (1998) | 85 | +0.24* |
| Dawson (2003) | 258 | +0.15* |
| de Haan and Siermann (1998) | 78 | +0.17 |
| de Hann and Sturm (2000) | 80 | +0.19 |
| Fidrmuc (2003) | 275 | +0.34* |
| Park and Ginarte (1997) | 60 | −0.18 |

*Statistically significant at least at the 10% level.

The average partial correlation of physical capital (+0.33) is slightly higher than the partial correlation for economic freedom (+0.28), while the partial correlation for human capital (+0.22) is lower. The 95% confidence intervals suggest, however, that the differences in these partial correlations are not likely to be statistically significant. That is, the magnitude of the contribution of economic freedom to economic growth is similar to that made by physical and human capital formation. Note that the human and physical capital partial correlations are derived from *only* the economic freedom studies. There are many more studies that have explored the impact of human and physical capital on economic growth that do not include economic freedom. Hence, caution is needed before the partial correlations relating to human and physical capital are interpreted to be the underlying association between capital formation and economic growth. It would be very interesting

Table 4
Meta-analysis of partial correlations of economic and political freedom and human and physical capital on economic growth

| | Unweighted average partial correlation | Sample size weighted average partial correlation |
|---|---|---|
| *Economic freedom* | | |
| Impact of economic freedom on economic growth | +0.36 (+0.29 to +0.42) ($N$=45) | +0.28 (+0.18 to +0.42) ($N$=45) |
| Impact of economic freedom on physical capital | +0.18 (+0.08 to +0.26) ($N$=10) | +0.21 (+0.11 to +0.29) ($N$=10) |
| *Other variables* | | |
| Impact of physical capital on economic growth (economic freedom studies) | +0.47 (+0.37 to +0.57) ($N$=30) | +0.33 (+0.22 to +0.53) ($N$=30) |
| Impact of human capital on economic growth (economic freedom studies) | +0.28 (+0.19 to +0.41) ($N$=20) | +0.22 (+0.11 to +0.38) ($N$=20) |
| Impact of democracy on economic growth (economic freedom studies) | +0.16 (+0.07 to +0.25) ($N$=14) | +0.08 (+0.03 to +0.20) ($N$=14) |
| Impact of property rights on economic growth | +0.35 (+0.23 to +0.47) ($N$=10) | +0.30 (+0.20 to +0.42) ($N$=10) |

Each cell reports separate meta-analysis. $N$=number of studies included in meta-analysis.

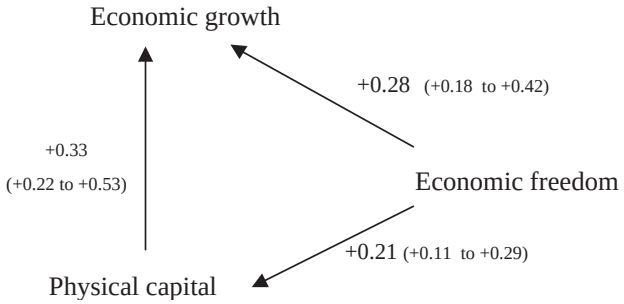


Fig. 1. Economic freedom and growth, direct and indirect channels.

to compare our results with the partial correlation of physical capital and economic growth among those empirical growth studies that *do not* include economic freedom. It is possible that this latter group reports larger partial correlations, because they fail to take account of the contributions of economic freedom.[16]

The impact of democracy on economic growth is rather weak, with an average partial correlation of around +0.08. The conclusion from this group of studies is that political freedom has a small and statistically significant positive effect on economic growth, in the presence of economic freedom in the analysis. While a meta-analysis of the entire pool of empirical studies that have explored the links between political freedom and economic growth is beyond the scope of this paper, we note that the existing qualitative reviews have drawn mixed results from this literature (see Sirowy and Inkeles, 1990; Przeworski and Limongi, 1993). Since economic freedom is an important driver of economic growth, failing to control for its influence is likely to lead to misspecification. Hence, if we take our lead from the economic freedom literature, we can conclude that democracy has a beneficial impact on economic growth. Note, however, that the average partial correlation of democracy is significantly lower than it is for economic freedom (+0.08 is less than +0.28) and the intervals have very little overlap (+0.03 to +0.20 compared to +0.18 to +0.42). We conclude from this that the impact of economic freedom on economic growth is significantly greater than that of political freedom.

The last row of Table 4 shows that the property rights component of economic freedom has a strong positive and statistically significant affect on economic growth, with a similar magnitude to economic freedom in general.

## 4. Exploring specification bias

Before concluding that Table 2 identifies and quantifies the magnitude of a genuine effect of economic freedom on economic growth, it is important to determine whether the literature has been influenced by specification bias. The impact of specification differences

[16] We thank an anonymous referee for this suggestion.

can be investigated by estimating a meta-regression model (known as a MRA) of the following form:

$$r_i = \alpha + \beta_1 N_i + \gamma_1 X_{i_1} + \ldots + \gamma_k X_{i_k} + \delta_1 K_{i_1} + \ldots + \delta_n K_{in} + u_i \quad (1)$$

where

$r_i$ is the observed partial correlation derived from the $i$th study,
$\alpha$ is the constant,
$N_i$ is the sample size associated with the $i$th study,
$X$s are dummy variables representing characteristics associated with the $i$th study,
$K$s are the mean values of any quantifiable variables associated with the $i$th study, and
$u_i$ is the disturbance term, with usual Gaussian error properties (see Stanley and Jarell, 1998).

The number of observations (actually studies) available for the MRA is relatively small (45 in the case of the one study–one estimate dataset). This limits the extent to which meta-regression moderator variables can be explored. Hence, we restrict the meta-regression analysis to the following key variables:

- *FRASER*: a dummy variable equal to 1 if the Fraser Institute measure of economic freedom was used and 0 otherwise.
- *AGGREGATE*: a dummy variable if an aggregate measure of economic freedom was used and 0 if a disaggregate measure was used.
- *DEMOCRACY*: a dummy variable equal to 1 if a study included political freedom as a control variable and 0 otherwise.
- *HKPK*: a dummy variable equal to 1 if a study included both human and physical capital as control variables and 0 otherwise.
- *CAPITAL*: a dummy variable equal to 1 if a study included physical capital as a control variable and 0 otherwise.
- *SIZE*: the sample size of a study (scaled by 1000).
- *YEAR*: the publication date of the study (scaled by 1000).
- *CAUSALITY*: a dummy variable taking a value of 1 if the analysis was based on causality testing (typically a Granger causality test), 0 otherwise.[17]
- *PANEL*: a dummy variable taking a value of 1 if the study used panel data and 0 if cross-sectional data was used.
- *KYKLOS*: a dummy variable taking a value of 1 if the study was published in *Kyklos*, 0 otherwise.
- *CATO*: a dummy variable taking a value of 1 if the study was published in the *Cato Journal*, 0 otherwise.

[17] Dawson (2003) notes correctly that the way that regression models are specified produces information on the correlation between economic freedom and economic growth, not causation. Dawson analyses the issue with Granger-causality tests. Although this is the strongest test on causality, Dawson acknowledges that the results imply *Granger-causation*, rather than the true sense of the word "causation".

- *PUBLIC*: a dummy variable taking a value of 1 if the study was published in *Public Choice*, 0 otherwise.
- *EJPE*: a dummy variable taking a value of 1 if the study was published in the *European Journal of Political Economy*, 0 otherwise.
- *CHANGE*: a dummy variable taking a value of 1 if the change in economic freedom was used, and 0 if the level was used.
- *PROPERTY*: a dummy variable taking a value of 1 if a measure of property rights was used, 0 otherwise.

Close inspection of the published studies shows that the above variables capture the key differences in the studies. Hence, an MRA of these variables should offer useful information on whether differences in the way studies are constructed affects the reported economic freedom–economic growth effects.

The *FRASER* variable is included to explore whether the measure of economic freedom affects the reported economic freedom effects. The impact of data aggregation is captured by the *AGGREGATE* variable. This tests whether aggregate measures of economic freedom lead to different estimates of the economic freedom–economic growth association. *DEMOCRACY*, *HKPK* and *CAPITAL* explore the impact of different control variables. *SIZE* is included to detect any differences in reported results between small and large sample studies. *YEAR* captures any fad effects, as well as whether the reported results change over time. *CAUSALITY* explores any differences between a causality testing framework and a growth regression. *PANEL* captures any differences in the type of data used. *KYKLOS*, *CATO*, *PUBLIC*, and *EJPE* capture any differences in the publication outlet. Most estimates are based on the level of economic freedom.[18] However, some studies report estimates based on the change in the level of economic freedom. The *CHANGE* dummy is included in the MRA of the large dataset to explore differences that may arise when change is used instead of the level of economic freedom. Together, these variables capture differences in specification, functional form, data and publication outlet.[19] With the exception of *CAPITAL* we have no prior expectations regarding the sign of any of these MRA variables. We do expect however that *CAPITAL* should have a negative sign due to the partial correlations obtained between economic freedom, investment and growth in Section 3. Studies that fail to control for the impact of capital on growth would tend to overstate the economic freedom–economic growth association.

The MRA estimates are presented in Table 5, for the three different datasets. Columns 2, 4 and 6 present the general MRA with all potential explanatory variables included, while columns 3, 5 and 7 present the specific MRAs, after sequentially eliminating any variables which were not statistically significant at the 10% level.[20] The MRA results confirm our expectations. A properly specified growth regression should control for the impact of capital (Levine and Renelt, 1992). Regardless of the dataset, controlling for capital in the

[18] All the estimates included in the one study–one sample dataset are based on the level of economic freedom.
[19] In addition, when the larger datasets are used, we included in the MRA dummy variables for different authors.
[20] The Wald coefficient restrictions tests, presented at the bottom of Tables 5 and 6, test the exclusion of statistically insignificant variables. In all cases the Wald tests confirm the elimination of statistically insignificant variables.

Table 5
Meta-regression analysis, economic freedom and economic growth, all studies (dependent variable = partial correlations of economic freedom and economic growth)

| Variable | Small database-general (2) | Small database-specific (3) | Medium database-general (4) | Medium database-specific (5) | Large database-general (6) | Large database-specific (7) |
|---|---|---|---|---|---|---|
| Constant | −25.31 (−1.36) | 0.46 (7.77)*** | −26.79 (−1.58) | 0.50 (12.14)*** | −29.54 (−1.90)* | 0.32 (6.89)*** |
| *Journal variables* | | | | | | |
| CATO | 0.09 (1.06) | – | 0.07 (0.97) | – | 0.10 (1.82)* | – |
| KYKLOS | −0.11 (−0.89) | – | −0.13 (−1.36) | – | −0.17 (−2.64)*** | −0.20 (−3.67)*** |
| EJPE | −0.09 (−1.12) | – | −0.12 (−1.07) | – | −0.04 (−0.47) | – |
| PUBLIC | −0.05 (−0.502) | – | −0.02 (−0.24) | – | −0.06 (−0.79) | – |
| *Specification variables* | | | | | | |
| HKPK | −0.10 (−1.08) | – | −0.01 (−0.11) | – | −0.11 (−1.92)* | – |
| CAPITAL | −0.07 (−0.74) | −0.14 (−2.14)** | −0.14 (−1.67) | −0.16 (−3.36)*** | −0.09 (−1.45) | −0.13 (−3.23)*** |
| DEMOCRACY | −0.09 (−1.46) | – | −0.06 (−1.19) | – | −0.07 (−1.40) | – |
| CAUSALITY | −0.24 (−2.16)** | −0.16 (−1.82)* | −0.19 (−1.85)* | – | −0.06 (−0.68) | – |
| *Data variables* | | | | | | |
| FRASER | −0.07 (−0.92) | – | −0.08 (−1.32) | – | −0.04 (−0.86) | – |
| PANEL | −0.15 (−2.23)** | −0.17 (−2.49)** | −0.15 (−2.01)** | −0.24 (−5.01)*** | −0.19 (−2.55)** | −0.21 (−5.27)*** |
| SIZE/1000 | −0.07 (−1.14) | – | −0.08 (−1.17) | – | −0.07 (−0.96) | – |
| YEAR/1000 | 12.94 (1.38) | – | 13.70 (1.61) | – | 14.99 (1.93)* | – |
| *Disaggregation variables* | | | | | | |
| AGGREGATE | – | – | – | – | 0.10 (1.08) | 0.14 (3.70)*** |
| PROPERTY | – | – | – | – | 0.10 (1.43) | – |
| CHANGE | – | – | – | – | 0.25 (3.53)*** | 0.21 (2.68)*** |
| *N* | 45 | 45 | 68 | 68 | 148 | 148 |
| Adj *R*-squared | 0.09 | 0.18 | 0.26 | 0.24 | 0.29 | 0.27 |
| *F*-statistic | 1.35 | 4.52** | 2.89*** | 11.68*** | 3.92*** | 8.69*** |
| Wald test | – | 1.35 | | 1.01 | – | 1.29 |

*, **, *** denotes statistical significance at the 10%, 5% and 1% levels, respectively. *t*-statistics in brackets using White's heteroscedasticity consistent standard errors.

growth equation produces a smaller partial correlation between economic freedom and economic growth (as shown by the negative coefficient on the *CAPITAL* variable). Omitting the impact of capital in a growth equation leads to a misspecification of the growth equation with real consequences for the estimated impact of economic freedom.

The only other variable that is consistently significant in the MRA is the use of panel data (*PANEL*). This literature uses either cross-sectional data (capturing the long-run effects) or panel data (capturing the transitory effects), with one study using time series data. The use of panel data leads to lower estimates of the impact of economic freedom. This implies that transitory effects are lower than long-run effects.

The analysis presented in this paper shows clearly that both economic freedom and physical capital matter for growth. Hence, just as the association between economic freedom and economic growth is overstated when capital is excluded from a growth model, so too, the association between physical capital and economic growth may be overstated by the exclusion of economic freedom. Moreover, as can be seen from Table 4, economic freedom stimulates growth indirectly through the investment channel. If researchers fail to account for this channel, then they may assign too much importance to investment and understate the contributions of economic freedom.[21]

When the extended dataset is used (using both aggregate and disaggregate measures of economic freedom) we can test more fully for the impact of aggregation. It is clear from Table 5, column 7, that aggregation matters. Studies that use an aggregate measure of economic freedom produce larger economic freedom–economic growth effects.

*CAUSALITY* is statistically significant and has a negative sign in some of the meta-regressions. That is, there is some evidence that studies that use a Granger causality analysis establish smaller economic freedom–economic growth associations. These studies use panel data and panel data lead to lower partial correlations. Of the four dummy variables that capture the effects of different journals, only *KYKLOS* is statistically significant, but only when the larger dataset is used. *CATO* was statistically significant in the general model when the larger dataset is used. The coefficient for *KYKLOS* is negative and for *CATO* it is positive. This indicates that after controlling for the key features of the empirical studies, *KYKLOS* tends to report smaller partial correlations and *CATO* larger ones than the rest of the literature. On the other hand, the dummy variables for the leading journals in this area (*Public Choice* and the *European Journal of Political Economy*) were never statistically significant.

When the large dataset is used *SIZE* is statistically significant. The negative coefficient means that the partial correlation between economic freedom and economic growth falls as sample size increases. Ceteris paribus, larger studies should give a closer approximation to the genuine underlying economic freedom–conomic growth association. Smaller studies are expected, on average, to have greater variation around the genuine effect.[22]

Mirroring the meta-analysis results presented in Table 4, the property rights measures are not statistically significant, meaning that they produce partial correlations similar to aggregate measures of economic freedom.

[21] An anonymous referee brought this issue to our attention.
[22] See Doucouliagos (2005) for further details on this issue.

Table 6
Meta-regression analysis, economic freedom and economic growth, studies using Fraser Institute measure (dependent variable = partial correlations of economic freedom and economic growth)

| Variable | Medium dataset-general (2) | Medium dataset-specific (3) | Large dataset-general (4) | Large dataset-specific (5) |
|---|---|---|---|---|
| Constant | 9.78 (0.32) | 0.45 (9.46)*** | −31.23 (−1.13) | 0.35 (4.18)*** |
| *Journal variables* | | | | |
| CATO | 0.02 (0.18) | – | 0.03 (0.48) | – |
| KYKLOS | −0.10 (−0.75) | – | −0.13 (−1.42) | – |
| EJPE | −0.08 (−0.53) | – | 0.11 (0.82) | – |
| PUBLIC | 0.07 (0.45) | – | −0.15 (−1.24) | |
| *Specification variables* | | | | |
| HKPK | 0.02 (0.24) | – | −0.08 (−1.13) | – |
| CAPITAL | −0.16 (−1.36) | −0.13 (−2.37)** | −0.0 (−1.15) | −0.14 (−2.21)** |
| DEMOCRACY | −0.01 (−0.19) | – | −0.01 (−0.19) | – |
| CAUSALITY | −0.09 (−0.61) | – | 0.13 (0.78) | – |
| *Data variables* | | | | |
| PANEL | −0.23 (−2.98)*** | −0.25 (−6.61)*** | −0.39 (−3.79)*** | −0.29 (−6.21)*** |
| SIZE/1000 | −0.04 (−0.55) | – | 0.02 (0.32) | – |
| YEAR/1000 | −4.64 (−0.30) | – | 15.79 (0.78) | – |
| *Disaggregation variables* | | | | |
| AGGREGATE | – | – | 0.11 (0.78) | 0.13 (2.12)** |
| PROPERTY | – | – | 0.18 (1.25) | 0.17 (1.71)* |
| CHANGE | – | – | 0.18 (2.13)** | 0.17 (2.10)** |
| *N* | 44 | 44 | 98 | 98 |
| Adj *R*-squared | 0.20 | 0.27 | 0.28 | 0.31 |
| *F*-statistic | 1.97* | 9.36*** | 2.99*** | 6.56*** |
| Wald test | – | 1.35 | | 1.22 |

*, **, *** denotes statistical significance at the 10%, 5% and 1% levels, respectively. *t*-statistics in brackets using White's heteroscedasticity consistent standard errors.

The majority of the researchers regress growth *rates* on the *levels* of freedom. de Haan and Sturm (2000) found that the *change* in economic freedom, rather than its *level*, was *robustly* related to economic growth. Pitlik (2002) also documents that volatility of freedom matters. Gwartney et al. (1999) also found strong evidence in favor of the effects of *changes* in economic freedom on economic growth. They even suggest that a lagged effect in the change of economic freedom should be allowed for, because it takes time for governments to earn credibility.[23] The MRA results show that the *CHANGE* variable is statistically significant, with a positive sign. That is, studies that use the change in economic freedom report larger economic growth effects than studies that use the level of economic freedom.

The robustness of the MRA results was explored by adding additional variables. There are several variables which we considered but for which data was lacking. For example,

[23] de Haan and Sturm (2000) point out that the use of levels as well as change in the same regression will lead to an endogeneity problem.

the adjusted *R*-squared was not reported by many studies, so it could not be included as a control variable. Likewise, most studies do not report the average value of the economic freedom measure. Data were, however, available for several other variables but the MRA results with these variables included are not presented here. For example, a dummy variable for the Scully and Slottje measure of economic freedom was included, but this was never statistically significant. We considered also regional dummy variables (for Latin America, Asia, OECD and Africa), the number of countries included in the sample and the proportion of developed countries included in the sample. The inclusion of these variables reduces the sample size, as many studies do not report this information. All of these results are available from the authors.[24]

The MRA was repeated for only those studies that use the Fraser Institute's measure of economic freedom. These results are presented in Table 6. *CAPITAL*, *PANEL*, *AGGREGATE* and *CHANGE* remain statistically significant, although *SIZE* and *KYKLOS* are no longer statistically significant. Most of the coefficients are similar in magnitude.[25]

## 5. Testing the MRA predictions

In order to test the MRA conclusions (Table 5) regarding the importance of physical capital in growth equations and the use of cross-section versus panel data, we estimated a standard Solow growth model with and without physical capital, and with and without political freedom. The data set consists of 82 countries for which we were able to match political freedom, economic freedom, and the other growth related variables.[26] The dataset spans the period 1970–1999 and is structured into 5-year intervals. We measure growth as the logarithmic change in real output per worker from the first year of the interval to the last. Other variables are the averages of the 5-year intervals and were obtained from the *World Development Indicators CD-R*OM (World Bank, 2003), except for the human capital and economic freedom data, which are available for the initial years of the intervals (1970, 1975, etc.). Human capital is measured as the proportion of the population which has completed secondary education (Barro and Lee, 2001). Capital is proxied by investment's share in GDP. Labor force data was derived from the International Labor Organisation. The series for economic freedom is that of the Fraser Institute (Gwartney and Lawson, 2003). Political freedom is measured as the average of the Gastil political and civil liberties data (the Freedom House series). The sample size is 380 observations.

[24] In these robustness checking regressions, the only other variable to emerge statistically significant was the OECD regional dummy (coefficient 0.29, *t*-statistic 2.36). This suggests that the inclusion of OECD countries in a sample increases the economic freedom–economic growth association. However, the sample size from this regression was relatively small. Note, however, that for all of these regressions the variables *CAPITAL* and *PANEL* remained statistically significant and continued to have a negative sign.

[25] We estimated also the MRA models using weighted least squares (Whitehead, 2003), using sample sizes as weights (see Hunter and Schmidt, 2004). This regression does not include sample size as an explanatory variable. The results are qualitatively similar to those presented in Tables 5 and 6.

[26] The sample does *not* include transitional economies, very small economies and oil producing countries as per Mankiw et al. (1992). The data are available from the authors.

Table 7
Sensitivity of Solow growth model to physical capital (dependent variable = logarithmic change in real output per worker)

| Variable | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| *Panel data (1970–1999, N = 380)* | | | | |
| Constant | −0.80 (−5.75)*** | −0.13 (−1.04) | −0.76 (−4.98)*** | −0.17 (−1.16) |
| ln (physical capital) | 0.19 (8.16)*** | – | 0.19 (8.16)*** | – |
| ln (human capital) | 0.01 (1.24) | 0.02 (2.69)*** | 0.01 (1.08) | 0.03 (2.74)*** |
| ln $(n+g+\delta)$ | −0.15 (−3.10)*** | −0.06 (−1.25) | −0.14 (−2.93)*** | −0.07 (−1.33) |
| ln (initial GDP) | −0.03 (−3.67)*** | −0.02 (−2.72)*** | −0.03 (−3.65)*** | −0.02 (−2.32)** |
| Economic freedom | 0.015 (2.26)** | 0.027 (3.72)*** | 0.016 (2.13)** | 0.027 (3.75)*** |
| Political freedom | – | – | −0.003 (−0.69) | 0.003 (0.54) |
| Partial correlation | 0.12 | 0.19 | 0.11 | 0.19 |
| Adjusted $R$-squared | 0.20 | 0.06 | 0.20 | 0.05 |
| *Cross-sectional data (average 1970–1999, N = 82)* (dependent variable = logarithmic change in real output per worker) | | | | |
| Economic freedom | 0.013 (1.24) | 0.029 (2.45)** | 0.015 (1.38) | 0.031 (2.64)** |
| Partial correlation | 0.14 | 0.27 | 0.16 | 0.29 |
| Adjusted $R$-squared | 0.38 | 0.19 | 0.38 | 0.20 |

*, **, *** denotes statistical significance at the 10%, 5% and 1% levels, respectively. ln denotes the natural logarithm. $n$ = population growth, and $g+\delta$ is the exogenous growth in technology and capital depreciation (capped to 0.05 together as is standard in the literature). $N$ = sample size. $t$-statistics in brackets using White's heteroscedasticity consistent standard errors.

Ignoring issues of endogeneity and causality (which are not the focus of this paper), we use OLS to estimate the Solow growth model, as extended by Mankiw et al. (1992). OLS in this context is useful for comparability with results from other papers. The results are presented in Table 7. In all cases, the coefficient on economic freedom is positive and statistically significant. Note, however, that the exclusion of physical capital in a growth equation increases significantly the magnitude of the economic freedom coefficient. In Model 2, the coefficient is 80% higher than in Model 1, and in Model 4 it is 70% higher than Model 3. The partial correlations between economic freedom and economic growth are reported also in Table 7, and these are higher when capital is excluded.

The Solow growth model was reestimated using cross-sectional data. The cross-sectional data was constructed by taking the average value for all the variables over the 1970–1999 period. The sample size is thus 82 observations. These results are presented also in Table 7. Once again, it is clear that the inclusion of physical capital reduces the coefficient on economic freedom. In this simple framework, economic freedom has a positive but statistically insignificant effect on growth (see Models 1 and 3).[27] Note that for this data set and rather simple growth framework, the use of cross-sectional data does lead to slightly higher coefficients on the economic freedom variable and higher partial correlations between growth and economic freedom. Moreover, compare Model 2 using cross-sectional data to Model 1 using panel data. The partial correlations between

[27] Recall, however, that economic freedom has a positive impact on investment and hence a positive indirect effect on growth is still possible (see Table 3).

economic freedom and growth are 0.27 and 0.12, respectively. As predicted by the MRA, studies that use cross-sectional data and exclude investment from the growth regression will report significantly higher freedom–growth effects.

## 6. Conclusions

The identification of the factors that drive economic growth is crucially important for economic development and social welfare. This requires empirical analysis by many researchers, and requires also that inferences be drawn from the available evidence. Economic freedom is an important aspect of economic performance and has received considerable attention from researchers. To date, no systematic synthesis of this literature has been conducted. This paper has provided such a synthesis, and in the process highlights the strengths and weakness of this literature.

The meta-analysis shows clearly that there is a positive and statistically significant association between economic freedom and economic growth. Importantly, this association is very robust. That is, regardless of the sample of countries, the measure of economic freedom and the level of aggregation, there is a solid finding of a direct positive association between economic freedom and economic growth. This association is both statistically significant and of economic importance. In addition, economic freedom has an indirect positive effect on economic growth through its positive impact on physical capital formation. It was shown also that economic freedom has a significantly greater affect on economic growth than does political freedom.

The meta-regression analysis presented in this paper shows clearly that specification issues matter. The meta-regression analysis shows that there is solid evidence that the economic freedom literature (like all other empirical literatures) is affected by specification differences. The meta-regression analysis was confirmed by our own growth equations that show the impact of not including physical investment when investigating the impact of economic freedom on economic growth. Failing to introduce adequate controls leads to biased estimates of the contribution of economic freedom. Similarly, given the contributions of economic freedom, studies that fail to control for the impact of economic freedom will produce biased estimates of, for example, the contributions of capital, foreign aid, foreign direct investment, geography, democracy, religion, etc.

Meta-analysis can be used to guide future research. The results presented in this paper suggest that additional studies are needed which adopt a proper production function framework and which consider the channels through which economic freedom may impact on economic growth. The use of simultaneous equations model that captures both the direct and indirect effects of economic freedom on growth promises to be a fruitful strategy.

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