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**Is Democracy-Led Economic Growth a Myth or a Reality?
Evidence from a Meta-Analysis Study**

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Abstract

No definite conclusions have been drawn regarding the impact of political democracy on economic growth in spite of a plethora of theoretical and empirical studies. This study tries to explain the inconclusive relationship and overcome it if possible by the use of a quantitative assessment of the democracy-growth literature following the work published by Doucouliagos and Ulubasoglu in 2008. It applies meta-regression analysis to the population of 1221 estimates derived from 110 studies on democracy and economic growth. Using traditional meta-analysis estimators, publication selection bias tests, and Fixed and Random Effects meta-regression models, it derives some robust conclusions. Taking all the available published evidence together, it concludes that democracy has a zero direct impact on economic growth. However, democracy has robust, significant, and positive indirect effects through higher levels of economic freedom whereas it has robust, significant, and negative indirect effects through higher levels of income inequality. Democracies may also be associated with larger governments and less free international trade. There also appear to be country- and region-specific democracy-growth effects. Overall, democracy's net effect on the economy is minimal and not detrimental.

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1. Introduction

Economists have been trying to determine the linkages between political democracy and economic growth for more than 50 years. A multitude of cross-country research studies have not been able to bridge the theoretical divide on the impact of democratic versus authoritarian regimes on economic growth since their empirical results are ambiguous at best, resulting in a general agreement among economists of an inconclusive relationship. This paper tries to come to a firm and robust conclusion about the relationship of democracy and economic growth. It builds on the previous work done by H. Doucouliagos and M.A. Ulubasoglu¹ who have shown that a meta-analytic approach to the investigation of the primary studies is possible to help us come to several stable and strong conclusions regarding the relationship between democracy and economic growth.

Proponents of the “democracy-led growth” hypothesis argue that the desire of people to work and invest, the effective allocation of resources in the marketplace, and profit-maximizing private enterprise can all be sustained in a climate of political freedom, free-flowing information, and protected private property rights (North 1990). Democracies can control government intervention in the economy; are responsive to public concerns on areas such as education, justice, and health; and promote stable and long-run growth (Baum and Lake 2003; Lake and Baum 2001; Rodrik 1998). Opponents of this hypothesis, on the other hand, argue that democracies are prone to succumb to popular demands for immediate consumption at the expense of profitable investments, cannot be protected from the interests of rent seekers, and cannot organize the resources of the economy quickly. Democracies are also blamed for conflicts due to social, ethnic, and class struggles. While some authors favor authoritarian regimes to take

all measures necessary for rapid growth, others remain overall skeptical on whether political regimes, rather than markets and institutions, matter for growth (Bhagwati 1995).

The availability of useful data and an increasing number of efficient econometric techniques have given researchers the ability to study this hypothesis. The empirical findings, however, stretch over a continuum of negative, insignificant, and positive estimates, creating a puzzle as to the true relationship of democracy to economic growth. For example, the distribution of results that Doucouliagos and Ulubasoglu have compiled from 483 regression estimates from 84 published democracy-growth studies shows that 15% of the estimates are negative and statistically significant, 21% of the estimates are negative and statistically insignificant, 37% of the estimates are positive and statistically insignificant, and 27% of the estimates are positive and statistically significant. This implies that nearly three-quarters of the regressions have not been able to find the “desired” positive and significant sign for the impact of democracy on growth. It also implies that around half of the regression models have found statistically significant estimates while the other half found statistically insignificant ones. Such different results are not unanticipated because the research questions asked are understandably narrow and approach the issue from different angles. For example, while some primary studies focus on the physical investment channel between democracy and growth, others look at the human capital or political instability channels. In like manner, some primary studies present structural estimates of a well-defined model, whereas others focus on empirical uniformities in the data. Thus, the question is perplexed with a continuum of estimates, which vary due to data sources, estimation techniques, sample compositions, and time periods².

This paper presents a meta-analysis on the democracy-growth relationship, based on 110 published studies. It follows the work published by H. Doucouliagos and M.A. Ulubasoglu in 2008. It contributes 35 new primary studies to 75 out of the 84 primary studies that H. Doucouliagos and M.A. Ulubasoglu used in their work. More importantly due to the abundance of the data in the new studies it uses 1221 regression estimates in order to study the effect size and direction of democracy on economic growth, thus increasing its accuracy and precision. First, it offers a complete assessment of the democracy-growth findings based on the entire pool of estimates in the published literature. Second, the quantitative assessment is used to come to strong conclusions on the magnitude and the significance of the democracy-growth relationship. Third, it investigates the factors driving the heterogeneity of the results that have been noted by individual studies.

Meta-regression analysis (MRA) is the systematic review and quantitative synthesis of empirical economic evidence on a given hypothesis, phenomenon, or effect. MRA is a type of meta-analysis that is explicitly designed to integrate econometric estimates, typically regression coefficients or transformations of regression coefficients; in our case partial correlations³. It seeks both to summarize and to explain the wide, often disparate, variation routinely found among reported econometric results. Although guidelines for conducting and reporting meta-analyses have been offered before (Higgins and Green, 2008; Stroup et al., 2008), none have explicitly considered the type of empirical evidence typically found in applied econometric research. Moreover, existing MRA guidelines in the economics literature focus primarily on methodological aspects of econometric estimation and interpretation (e.g., Nelson and Kennedy, 2009), rather than on broader standards of MRA practice and reporting. Because MRA is widely accepted throughout the scientific literature, and in order to safeguard the validity and

replicability of our results we comply with the reporting protocols that were put forth by the members of the Meta-Analysis of Economics Research Network (MAER-Net) as explained in the Technical Appendix of this paper.

Meta-analysis assumes that each study is a data point in the knowledge-generating structure towards the true democracy-growth relationship and that it may show some random or systematic variations from the true relationship. An important factor for such variation is sampling error. At the level of an individual study, sampling error is a random and unknown event, which can make empirical results seem to be more different than they may in fact be. However, by examining all studies together, meta-analysis informs on the magnitude of sampling error and facilitates discarding these effects from empirical findings (Hunter and Schmidt 2004)⁴.

Another factor is research design. Studies convey diverse results due to differences in econometric specifications, country composition of samples, time periods, control variables, and estimation techniques. Meta-analysis can, among other things, help clear away such differences across studies, estimate their significance, and direct future research towards less biased studies⁵.

Once sampling error and research design differences are removed, meta-analysis supports examination of whether there is a latent relationship between democracy and growth. If there is a relationship, is it positive or negative, and does it vary across countries, regions, or time periods? Meta-analysis is also very useful for extracting important information on the indirect effects of democracy on growth. Capital formation, income inequality, political stability, price stability, and the size of government determine important structural differences among countries and influence long-run growth. Meta-analysis facilitates the statistical investigation of the relationships between democracy and these factors in a unified schema.

This paper supports the main conclusion of the previous work done by H. Doucouliagos and M.A. Ulubasoglu but with a caveat. It finds that once all the available evidence is considered, including all of the 1221 regression estimates of the effect size, the evidence does not point to democracy having a harmful influence on growth. Furthermore, we are able to conclude that the effect is not inconclusive. There is, in fact, a zero direct effect of democracy on growth. However, the results from the primary studies are highly heterogeneous with a lot of unexplained variance that cannot be attributed simply to sampling error or research design differences like Doucouliagos and Ulubasoglu do. The results are suggestive of region-specific effects on the democracy-growth relationship. Specifically, the direction of the growth effect of democracy appears to be positive in Latin America and negative in Africa and Asia while it is strong and negative in the developed countries. There are also other interesting indirect effects that emerge from the results that need to be further studied and analyzed before a definite and reliable conclusion is reached.

The paper is structured as follows. The second section provides a detailed literature review presenting the key theoretical arguments behind the democracy-growth relationship, and the next section discusses the meta-analysis methodology adopted in this paper. The fourth section discusses the data used. The fifth section is the heart of this paper, presenting meta-analysis and meta-regression analysis results. The sixth section concludes the paper with suggestions for further analysis of the current data set. The seventh section is an appendix-glossary of the variables used in the primary studies included in the meta-analysis. The eighth section is a technical appendix detailing the protocols followed in the research, coding and analysis process. The ninth section includes all the notes made throughout the paper and the final tenth section a list of all the references used in the research process.

2. Literature Review

2.1 Democracy-led growth hypothesis

Does political democracy cause economic growth? This is the question that needs to be answered for the democracy-led growth hypothesis to be resolved. Political regimes based on degree of democracy influence the economic growth of a market economy through the following channels; physical capital accumulation from internal and external sources, social and political stability, good governance, and political continuity.

We define physical capital accumulation from internal sources as saving, consumption and investment by local economic actors. A liberal democracy is concerned for the social welfare of the people and thus induces public and private spending on consumption for maintaining a satisfactory standard of living for its citizens. This usually leads to a decrease of national saving and investment. The economy fails to accumulate the physical capital, which is the foundation for economic growth at the initial stages of economic development. Politicians in a democratic welfare state ignore the necessary expenditures on the quality of highways, railroads, harbors, airports, large scale farming and industry. Instead, they are very eager to provide social services in the name of human development such as free education, health care, social security, fiscal subsidies and transfers, land distribution etc. Even these types of services contribute to economic development in the long run; superficial as it may be. Welfarism does not have direct linkage with human capital development which is needed in order to promote economic growth. Political freedom and democracy may undermine the effectiveness of government in maintaining fiscal discipline as well as law and order. Democratic regimes in LDC's⁶ promote consumption at the cost of saving. In contrast, authoritarian governments are said to limit consumption, increasing national savings, and thereby promoting economic growth.

We define physical capital accumulation from external sources as foreign aid, FDI⁷ & technology, and other external financial sources. Countries try to attract financial resources from external sources for physical capital accumulation. These sources are encouraged to invest in a country based on the stability and economic predictability that its political system can provide.

Social and political stability is another factor that promotes economic growth. The question is the degree to which a democracy is linked to social and political stability. Even within democratic regimes there are notable differences. Liberal democracies in well-developed and advanced industrial nations are more likely to exhibit permanent characteristics of social and political stability compared to their less developed counterparts.

Good governance is usually defined as the maintenance of roles and regulation, and lowering of the corruption. Political freedom and democratic government in developing countries are likely to lead to government corruption and bribery among the politicians and the bureaucrats. Democratic regimes seem to retard growth by promoting rent seeking, activities of pressure or interest groups whose primary goal is to grab the major share of the nation's economic pie. Democratic governments encourage trade and labor unions to demand unduly high wages, which leads to strikes and lockouts and the consequent loss of national output.

Political continuity usually leads to policy continuity and growth. As we know the outcomes of economic policies are received by an economy in the long run. In liberal democratic regimes government changes are frequent and economic policies also change quite frequently. Discontinuity of economic policy adversely affects economic growth.

What are some of the reasons that democratic regimes may be considered good for economic growth? First of all, only governments with some legitimacy will be able to implement and sustain policies that may bear high short-term costs. Secondly, several of the institutional

characteristics of a democracy, like an independent legal system, are also required for a successful economic liberalization. As North (1993) puts it, “well specified and enforced property rights, a necessary condition for economic growth, are only secure when political and civil rights are secure; otherwise arbitrary confiscation is always a threat”. Finally, democratization may limit rent-seeking due to its system of checks and balances. Recently, Rodrik (2000) has argued that democratic institutions - political parties, elected representatives, free speech, and the like - can be viewed as the ultimate institutions of conflict management, as they allow for differences among social groups to be resolved in a predictable, inclusive, and participatory manner. But, democratic regimes may lead to policies that hamper economic growth (rich-to-poor redistribution, large public sector, high taxes) due to majority voting. Influence of interest groups (Olson) will reduce the flexibility of the economy.

What are some of the reasons that authoritarian regimes may be considered good for economic growth? First of all, only an authoritarian government is in a position to introduce unpopular measures; electorates often turn down economic reform even when it is known in the end that they would benefit a majority of voters. Policies that would be popular *ex post* are often not implemented in a democratic regime. Secondly, the demand for comprehensive state action requires the presence of a strong state: there has been no case of successful economic development during the previous century without comprehensive political action, involving massive state intervention in the economy. Finally, supporters of this view often refer to the experience of countries such as Chile, South Korea and Taiwan. But, Dictators may also be forced to follow opportunistic policies if their survival in office is threatened. Authoritarian regimes are not homogeneous. While the apparent association of high economic growth with authoritarian regimes is suggested by the experience of several non-democratic “technocratic”

regimes (such as those in South-Korea and Taiwan), it is at the same time evident that there are many counter examples of “kleptocratic” and/or inept authoritarian regimes whose rule has led to slow economic growth rates. Authoritarian rule can mean arbitrary rule and undue interference, which may hinder economic growth. A strong state and an authoritarian state are not necessarily the same thing.

2.2 Proponents of the democracy-led growth hypothesis

The relationship between political factors and economic growth has come to light by the work of Lipset in 1959. His study examined how economic development is delayed by political regimes. Since then, the political environment has been thought to play an important role in economic growth. Dick (1974) in a cross-country analysis with regard to the effect of democracy, autocracy and bureaucracy on growth in 59 underdeveloped countries during the period of 1959-1968 comes to a conclusion that democracy has a positive effect on growth. Kormendi and Meguire (1985) in a cross-country analysis about the effect of democracy, autocracy and bureaucracy on growth in 47 countries during the period of 1950-1977 conclude that democracy caused an increase in the rate of economic growth.

Scully (1988, 1992), Remmer (1990) and Barro (1989) in cross-country studies about the effect of democracy, autocracy and bureaucracy on growth in 115 countries during 1960-1980, 11 Latin American countries during 1982-1988, and in 72 countries during 1960-1985 conclude that democracy increased the rate of economic growth at a faster pace than normal. Grier and Tullock (1989) show the different effect of democracy on growth in different regions. In a cross-country analysis of the effect of democracy, autocracy and bureaucracy on growth in

59 countries during 1961 -1980, they show that the effect of democracy on growth was more pronounced in Africa and no regime difference had any impact on growth in Latin America.

Dani Rodrik (1997) in a cross-country analysis by using a democracy index in 100 countries during 1970 -1994 demonstrates that democracy affects economic performance positively.

Gupta K.D, Madhavan M.C, and Andrew B. (1998) with pooled time series cross-country analysis during 1965-1986, three 7 year-periods 1965-71, 1972-79 and 1980-86 in 120 countries by using an index of political freedom and an index of democracy with political instability measures show that democracy affects economic growth positively.

Panther (1999) by using factor analytic methods, a Civic-ness indicator is extracted for 11 economies in transition that reflects trust in impersonal institutions and the attractiveness of non-democratic regimes to democratic government show that Civic-ness promotes both liberal-democratic institutional reforms and economic performance.

Douglas A. Hibbs, Jr (2001) with a qualitative approach to growth theory by using theories of growth with mathematical treatment illustrates that politics, policies and institutions affect the input factors of an economy and the marginal productivities, hence output and growth.

John C.Bluedorn (2001) with pooled decadal data analysis in 60 countries during the 1960s, 1970s, and 1980s by using democracy measures explains that democratic institutions have a positive influence on growth. However, democracies in homogeneous ethnic nations negatively affect economic growth.

Ludovic and Comeau (2003) in a cross-sectional analysis by using five political variables including initial democratic capital as a proxy for sociopolitical instability (standard deviation of political rights index means absence of stability) in 82 countries during 1979-1989 show that

democratic types of political regimes are more favorable to economic prosperity, and that a non-linear relationship exists between growth and regime type. They also show that sociopolitical stability which is achieved by democratic regimes most likely is a necessary complementary condition for economic growth.

James L. Butkiewicz and Halit Yanikkaya (2006) in a cross-country analysis by using measures of political and institutional variables in 100 countries conclude that the rule of law and democratic institutions promote economic growth.

2.3 Opponents of the democracy-led growth hypothesis

At the most basic form, political instability caused by democracy, bureaucracies or autocracies would increase the political uncertainty, discouraging investment and eventually hindering economic growth. Przeworski (1966) in a cross-country analysis of the effect of democracy, autocracy and bureaucracy on growth in 57 countries during 1949-1963 concludes that dictatorships in countries at medium development level help grow the economy faster than democracies. Adelman and Morris (1967) in a cross-country analysis of the effect of democracy, autocracy and bureaucracy on growth in 74 underdeveloped countries (including the communist bloc) during 1950 -1968 affirm that authoritarianism helped to increase growth in less and medium developed countries. Marsh (1979) in a cross- country analysis of the effect of democracy, autocracy and bureaucracy on growth in 98 countries during 1950-1970 concludes that authoritarian regimes helped the economy grow faster. Weede (1983) in a cross-country analysis of the effect of democracy, autocracy and bureaucracy on growth in 124 countries during 1960-1974 shows also that authoritarian regimes helped the economy grow faster. Finally, Landau (1986) in a cross-country analysis of the effect of democracy, autocracy and bureaucracy

on growth in 65 countries during 1960-1980 shows that authoritarian regimes increased the rate of economic growth in their economies.

Some studies have not reached a definite conclusion whether democracy affects growth or not. For example, Kohli (1986) in a cross-country analysis of the effect of democracy, autocracy and bureaucracy on growth in 10 underdeveloped countries during 1960-1982 comes to a conclusion that there was no difference in the 1960s, but authoritarian regimes were slightly better in the 1970s.

Pourgerami (1991) with evidence from 106 less developed countries shows that democracy decreased the rate of growth. Helliwell (1992) in a cross-country regression analysis of the effect of democracy, autocracy and bureaucracy on growth in 90 countries during 1960-1985 shows that democracy has a negative but statistically insignificant effect on growth.

Nelson M.A and Ram D. Singh (1998) in a study of 67 developing countries with cross-sectional analysis for the period of 1970-1989 with sub-divisions of 1970-1974, 1975-1979, 1980-1984 and 1985-1989 explain that economic freedom, not political freedom or democracy is relevant for growth in developing countries. South Korea, Taiwan and Singapore are cited in support of such contentions. There is no evidence that democracy, political and civil liberties are detrimental to growth.

Hamid Mohtadi and Terry L Roe (2003) in a two-sector endogenous growth model by following a mathematical approach show that higher democracy is associated with higher corruption (rent seeking) and higher corruption leads to low growth. Albert Saiz (2006) in a cross- country analysis by regressing a democracy index on the quantity and quality of roads in 75 countries illustrates that dictatorships have roads of a higher quality and quantity than democratic regimes. Since highways are part of the economic infrastructure, dictatorships

positively affect economic growth. Democracy negatively affects economic growth.

Selvarathnam Santhirasegaram (2007) in a cross-country analysis by regressing a democratic index on economic growth in 70 developing countries during 2000-2005 concludes that democracy in developing countries affects economic growth negatively.

Acemoglu D. et al (2008) reject that democratic societies are usually associated with a higher level of economic development than non-democratic societies. They argue that there is a two-way relationship between democracy and economic development. On the one hand, democracy has linkages to economic development; on the other hand, economic development leads to democratization. It is difficult to conclude that democracy promotes economic growth. Success of economic development concerning political regimes depends not only on democratic freedom but also on other socio-political factors such as leadership, mentality of people, history of a nation, international political environment, regional political environment, role of religion in politics, role of language policies, ethnic homogeneity, cast system, gender equality, colonization, and nature of independence etc.

2.4 Studies testing the democracy-led growth hypothesis

Below is a table listing all of the primary studies that tested the democracy-led growth hypothesis either directly or indirectly and that are included in the meta-analysis study presented in this paper.

Table 1: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
1.	T. Masaki & N. van de Walle (2014)	43 countries (SSA ⁸) (annual data)	1982-2012	Sequential estimation of 10 different specifications of a standard growth model controlling for several variables: POLS ⁹ , RE-GLS ¹⁰ & FE-OLS ¹¹	GDP p.c. ¹² Growth(%), (WDI ¹³), (PWT ¹⁴), (Maddison), GDP p.c. (US\$2000), Democracy level, Transition/interregnum, Democracy duration, FDI (% of GDP), Inflation, Terms of trade change (%), Life expectancy, Government consumption (% of GDP), Trade openness (% of GDP), Oil and gas production (% of GDP), Political violence, Former British colony, Former French colony, ELF ¹⁵ , Landlock, Tropical, Aid/GNI ¹⁶ (%), Country Dummies, Year Dummies	Strong evidence found that democracy is positively associated with economic growth more so for countries that have remained democratic for longer periods of time.
2.	H. Rachdi & H. Saidi (2015)	17 countries (MENA ¹⁷) (annual data)	1983-2012	Estimation of 5 different specifications of a standard growth model controlling for several variables: RE-GLS, FE-OLS & GMM ¹⁸ in system approach	Avg. ¹⁹ Annual GDP p.c. Growth (%), Inflation, Trade openness (% of GDP), Government consumption (% of GDP), Population Growth Rate, Democracy Score, Xrconst Autocracy Score, Xrcomp, Xropen	Strong evidence found that democracy has a robust negative impact on economic growth.
3.	B.A. Fida & M. Zakaria (2011)	1 country (Pakistan) (annual data)	1947-2006	Time series data regression analysis and estimation of 22 different specifications of a standard growth model controlling for several variables: GMM Arellano and Bond estimation technique used to overcome endogeneity and omitted variable problems as well as AR process is applied to remove autocorrelation from the model	Avg. Annual RGDP ²⁰ p.c. Growth (%), Democracy index, Political Constraint, Ln Capital stock per worker, Ln Human capital, Democracy Dummy, Ln Government consumption(% of RGDP), Trade openness(% of NGDP ²¹), Inflation rate, Ln Oil prices	Empirical results show that democracy has weak negative effects on economic growth in Pakistan and it is also found to have indirect effects on economic growth.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
4.	R.J. Barro (1996)	100 countries (annual data)	1960-1990	IV ²² Panel Regression Data Analysis run on several specifications of a basic neoclassical growth model in 3 separate equations for 3 different time periods, estimation method 3SLS ²³	Avg. Annual RGDP p.c. Growth (%), Ln(GDP) initial level, Male Schooling, Female Schooling, Ln(life expectancy), Ln(GDP)*human capital, Ln(fertility rate) Government consumption ratio, Public educational spending ratio, Black Market Premium, Rule of Law Index, Terms-of-trade change, Investment ratio, Democracy Index, Democracy index squared, Democracy index dummy for (0, .33), Democracy index dummy for (.33, .67)	Once the favorable effects on growth including maintenance of the rule of law, free markets, small government consumption, and high human capital and the initial level of real per capita GDP are held constant, the overall effect of democracy on growth is weakly negative. There is a suggestion of a nonlinear relationship in which more democracy enhances growth at low levels of political freedom but depresses growth when a moderate level of freedom has already been attained.
5.	J. Tavares, & R. Wacziarg (2001)	65 countries (5-year averages data)	1970-1989	Panel data and SEM ²⁴ : The basic econometric specification consists of a series of eight structural relationships describing the behavior of the endogenous variables. The model consists of a cross-country growth equation and seven channel equations, one for each of the channel variables Estimation methods: 3SLS, IV-GLS, SUR ²⁵ , SE-FE Within	Avg. Annual RGDP p.c. Growth (%) PPP ²⁶ adjusted, Democracy Index, Ln initial income, Investment rate (%), Human capital, Gini coefficient (%), Political instability, Black market premium, Trade share (% GDP), Government consumption (% GDP), Inflation rate (%), Terms of Trade, Religious Dummies, Oil Exporter Dummy, Postwar Independence Dummy, Colony Dummy, Log Area, Log Distance, Landlock Dummy, Population under 15, Population over 65, ELF	Results suggest that democracy fosters growth by improving the accumulation of human capital and, less robustly, by lowering income inequality. On the other hand, democracy hinders growth by reducing the rate of physical capital accumulation and, less robustly, by raising the ratio of government consumption to GDP. Once all of these indirect effects are accounted for, the overall effect of democracy on economic growth is moderately negative.
6.	M.G. Qureshi & E. Ahmed (2012)	73 countries (annual data)	1987-2002	Dynamic simultaneous equation framework that combines in a system the regression in differences with regression in levels applied on a cross country data set. GMM method of estimation	Avg. Annual RGDP p.c. Growth (%), Capital stock p.c., Democracy index, Ratio of sum of exports and imports to GDP (%), Gross secondary enrolment ratio (%), Life expectancy at birth (years)	There is evidence for a quadratic impact of democracy on per capita GDP growth (inverted U relation), that is per capita GDP is found to be increasing in democracies at low levels but after a certain moderate level of democracy this relation turns negative.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
7.	J. Gerring, P. Bond, W. T. Barndt, and C. Moreno (2005)	180 countries (annual data)	1900-2000	Estimation of 31 different specifications based on a standard growth model controlling for several variables: Pooled cross-country - time-series and panel data analysis- OLS with FE and AR ²⁷ (1) disturbance	Avg. Annual RGDP p.c. Growth (%), Democracy stock (1900–), Democracy level, GDP p.c. (ln), Inflation (ln), Investment (PWT), Instability (Banks), Trade openness (PWT), Life expectancy (WDI), Oil shock (dummy), Growth p.c. (trade-weighted), Population growth (WDI), Years independent, Regime durability (Polity IV), Social conflict (Marshall), Government consumption (PWT), Illiteracy (ln)	Democracy when measured as a level variable has no statistically significant effect on economic growth whereas democracy when measured as a stock variable has a highly significant positive growth effect. Long-term democracy leads to stronger economic performance.
8.	E. Weede (1997)	48 countries (annual data)	1960-1985	Basic regression analysis with OLS estimation	Avg. Annual RGDP p.c. Growth (%), RGDP p.c. initial level, Democracy, Primary School Enrollment, Agricultural labor, Top 20% income share, Middle 20% income share, Low 40% income share, Gini land ownership, Middle 20% times democracy, Gini land times democracy	It is questionable whether equality effects on growth apply only within democracies, as a median voter interpretation of this relationship should make one expect. The general idea that distributional struggle hurts the growth prospects of nations, however, receives some empirical support.
9.	T. Persson & G. Tabellini (2006)	150 countries (annual data)	1960-2000	Panel OLS Regression Data Analysis-FE both country and year. Estimation by difference in differences, where countries changing regime are the “treated” and those that do not are the “controls.”	GDP p.c. Growth (%) (PWT), Democracy dummy, Liberalization, Democracy after liberalization, Liberalization after democracy, Parliamentary democracy, Presidential democracy, Hazard rate out of current regime, Prob ²⁸ . of autocracy, Prob.of autocracy in lagged democracy, Regional Dummies, War Dummy, Socialist Dummy, Year Dummies, Country Dummies, Lagged Income	According to the study democracy promotes economic development in a subtle way depending on the details of democratic reforms. Presidential democracies seem to promote growth faster than parliamentary democracies.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
10.	D. Acemoglu S. Naidu P. Restrepo J. A. Robinson (2015)	175 countries (annual data)	1960-2010	Use of a dynamic (linear) panel model for GDP-FE OLS regression Estimation methods: within estimator, Arellano and Bond's GMM estimator and HHK ²⁹ estimator Semi-parametric estimates of the effect of democratizations on log GDP p.c. IV estimates of the effect of democracy on log GDP p.c. Effects of democracy on potential mechanisms of economic growth Heterogeneous effects of democracy on log GDP p.c.	Avg. Annual RGDP p.c. Growth (%), Ln(GDP p.c.) initial level, Investment Share of GDP, TFP ³⁰ , Trade Share of GDP, Primary Enrollment Rate, Secondary Enrollment Rate, Tax Revenue Share of GDP, Child Mortality Per 1000 births, Unrest Dummy, Market Reforms Index (0-100)	There is ample evidence that democracy has a significant and robust positive effect on GDP per capita. The results suggest that democracy increases future GDP (by about 20-25% in the 25 years following democratization) by encouraging investment, increasing schooling, inducing economic reforms, improving public goods provision, and reducing social unrest. There is little support for the view that democracy is a constraint on economic growth for less developed economies.
11.	M.N. Aziz & S.D.D. Sundarassen (2015)	7 countries (ASEAN ³¹) (annual data)	2000-2009	Modified Solow type growth model is estimated by POLS,FE,RE,2SLS, SGMM ³² used for both static(long -run) and dynamic(short-run) models	Avg. Annual RGDP p.c. Growth (%) PPP adjusted (WDI), RGDP p.c. PPP adjusted (2005)(WDI),Log labor force, Log gross fixed capital formation as % GDP, Log human capital, Log NCI ³³ , Log Polity2, Log Conflict, Log GFC ³⁴	The study finds that both intrinsic and extrinsic determinants of economic growth are significant. However, countervailing effects of extrinsic variables are documented for growth in ASEAN countries. Political regime type, so democracy also, is found to be statistically insignificant.
12.	H. Doucouliagos & M.A. Ulubasoglu (2008)	84 published papers on democracy & growth 483 estimates	1985-2005	Meta-regression analysis(MRA) OLS, FE & RE meta-regression models, the bootstrap	Partial correlation between democracy and economic growth, a set of Binary Variables taking the value of 1 if included in the studies in question and 0 otherwise including: Region, Inequality, Eco-freedom, Instability, Inflation, Population, Convergence, Human Capital, Physical Capital, etc.	The results of the meta-analysis showed that democracy does not have a direct impact on economic growth. However, it has robust, significant and positive indirect effects through higher human capital, lower inflation, lower political instability and higher economic freedom.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
13.	J. F. Helliwell (1994)	125 countries (annual data)	1960-1985	Pooled cross-sectional and panel data analysis. Use of a comparative growth framework in which growth of GDP per adult depends negatively on initial income levels, as implied by the convergence hypothesis, and positively on rates of investment in physical and human capital. Method of estimation: OLS stacked-Iterative Zellner, IV	Avg. Annual RGDP p.a. Growth (%), Ln(GDP p.a.) initial level, Ln(GDP p.a.) (85), Democracy Index-Bollen ⁶⁰ , Democracy Index-Gastill ⁷⁶ , Investment rate, Primary Schooling, Secondary Schooling, $n+g+\delta$, Scale	The general result of the growth analysis is that it is still not possible to identify any systematic net effects of democracy on subsequent economic growth. However, there is a robust positive relation between the level of per capita income and the adoption of democracy.
14.	J.M. Mbaku & M.S. Kimenyi (1997)	46 countries (annual data)	1950-1985	WLS ³⁵ Regression Analysis of the effects of political freedom on macroeconomic growth with the use of the Kormendi-Meguire Growth Model	Avg. Annual RGDP p.c. Growth (%), Ln(GDP p.c.) initial level, Mean Annual Rate of Population Growth, S.D. ³⁶ of Real Output Growth, S.D. of Money Supply Shocks, Mean of Money Supply Growth, Mean Growth Rate of Ratio Government Spending to Output, Mean Growth of Exports as a Proportion of Output, Mean Growth Rate of Inflation, Mean Investment to Income Ratio, Political Democracy Index	The results confirm the positive relationship between political freedom and economic growth.
15.	C. Kurzman, R. Werum, and R.E. Burkhardt (2002)	106 countries (annual data)	1951-1980	Pooled Time Series Analysis OLS on 30 years means MLE ³⁷ AR(1) correction	Avg. Annual RGDP p.c. Growth (%) (PWT), Investment _t , Literacy _{t=0} , Literacy _t , Life Expectancy _{t=0} , Life Expectancy _t , Initial Wealth _{t=0} , Initial Wealth _t , Population Growth _t , Democracy _t , Government Spending _t , Riots _t , World System Position	Little or no direct effect emerges between democracy and economic growth, but positive indirect effects appear via two mechanisms: a marginally significant effect via investment and a robust effect via government expenditure. Democracy also has a robust non-linear effect on economic growth via social unrest, inhibiting growth under non-democratic regimes and furthering it in highly democratic ones.

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Index	Authors	Countries	Period	Method	Variables	Empirical Results
16.	T. Plümpert & C. W. Martin (2003)	83 countries (annual data)	1975-1997	OLS Regression Analysis of a political economic model that predicts a systematic non-linear relationship between democracy and government spending as well as between democracy and economic growth	Avg. Annual RGDP p.c. Growth (%), Government Consumption/GDP, Initial (1975) Log GDP p.c., Investment share of GDP, Population Growth, Human Capital (lagged), Institutional Openness (Sachs-Warner dummy), Democracy (polity), Democracy squared, Regional Dummies, Bicameralism, Durability of Political System, Number of Veto Players	The results show that an increase in democracy tends to raise growth rates of per capita income. However, the beneficial impact of democracy on growth holds true only for moderate degrees of political participation. It is also empirically shown that there is a non-linear, inverse U-shaped relation between the level of democracy and growth of per capita income and that the impact of government spending on economic growth is higher in more democratic countries. Finally, it is demonstrated that the level of democracy and government share of GDP are correlated in a U-shaped manner.
17.	L. Arfaoui, A. Ziadi, S. Manai (2016)	1 country (Tunisia) (annual data)	1980-2014	Time Series Data Analysis Unit Root Tests ADF ³⁸ Co-integration Autoregressive Distributed Lag Model (ARDL ³⁹) Granger Causality Test ECM ⁴⁰ Diagnostic tests	Avg. Annual RGDP p.c. Growth (%), Political Rights (PR), Civil Liberties (CL), Democracy=(PR+CL)/2	The empirical results of this analysis have shown that in a nascent democracy such as the case of Tunisia democracy has no effect on economic growth in the short term. The addition of an observation rate of GDP during the period of post –revolution Tunisia generates a saw-tooth trend which demonstrates the unstable economic situation in the country.
18.	W. B. Djezou (2014)	1 country (Côte d'Ivoire) (annual data)	1960-2012	Time Series Data Analysis Unit Root Tests ADF Co-integration Autoregressive Distributed Lag Model (ARDL) Granger Causality Test VECM ⁴¹ OLS, FM-OLS ⁴² , D-OLS ⁴³	Avg. Annual RGDP p.c. Growth (%), Democracy (Polity IV), Regime Durability (Polity IV)	The results show co-integration of economic growth and democracy in the long run when regime durability is taken into account. The tests for causality show long run causality running from GDP per capita and regime durability to democracy.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
19.	A. Assiotis & K. Sylwester (2010)	119 countries (annual data)	1984-2007	Panel data regressions FE, Dynamic GMM regressions	Avg. Annual RGDP p.c. Growth (%) PPP adjusted (PWT), Population Growth rate, Democracy Index(FH ⁴⁴), Control of Corruption Index, DE*CO(interaction between democracy and control of corruption), Annual Government Share of RGDP p.c., Annual Investment Share of RGDP p.c., Reform Dummy,	<p>There is a positive relationship between economic growth and the degree of democracy that a country has as well as between economic growth and the control of corruption.</p> <p>However, the coefficient on the interactive term, combining democracy with control of corruption, is negative, suggesting that the benefits upon growth of controlling corruption are actually greater in authoritarian regimes.</p>
20.	M.Vega-Gordillo, & J. L. Alvarez-Arce (2003)	45 countries (annual data), (5-year averages used)	1975-1995	Use of a dynamic model defining causality along the lines established by Granger, 6 equations as parts of the model are tested for causality; equation of interest for us is the one connecting political freedom with economic growth. Estimation methods used are GMM1,GMM2 and AH ⁴⁵ instrumental variable estimator	Avg. Annual RGDP p.c. Growth (%), Index of Economic Freedom, Index of Political Freedom	<p>The dynamic relationships estimated strongly suggest that economic freedom fosters economic growth.</p> <p>The impact of political freedom on economic growth is much less clear but at least it is certain that it does not impede economic growth.</p>
21.	J.C. Heckelman (2010)	25 countries (transition nations) (annual data)	2000-2004	Several OLS Regressions with different democracy indicators.	Avg. Annual RGDP p.c. Growth (%), Log RGDP p.c. initial level, Gross capital formation to GDP ratio averaged over the 2000 – 2004 period, A dummy variable for the nations which comprise the CIS ⁴⁶ , Democracy indicators	<p>While the Freedom House democracy index is found to be statistically significant, the civil liberties component of this index is more robustly related to growth than is the political rights component.</p> <p>It is also found that among six different areas of democratic freedoms only freedoms in civil society and electoral process are robustly correlated with growth.</p>

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
22.	V.C. Jaunky (2013)	28 countries (SSA) (annual data)	1980-2005	Various panel unit root and cointegration tests, Panel VECM-based causality test, Blundell-Bond GMM2, Panel FM-OLS,D-OLS	Avg. Annual RGDP p.c. Growth (%), Log DEM ⁴⁷	Economic growth is found to cause democracy in the short-run, while bidirectionality is uncovered in the long-run. Democracy has a positive impact on GDP and vice versa. These results lend support to the virtuous cycle hypothesis.
23.	K. Grundler & T. Krieger (2016)	185 countries (annual data), (5-year period averages used)	1981-2011	Arellano-Bond dynamic panel data estimation technique GMM & WG(Within-Group) controlled for other democracy indicators such as POLITY, VANHAVEN, ACEMOGLU, FREEDOM HOUSE, BOIX, UDS	Avg. Annual RGDP p.c. Growth (%)lagged t-1,Log RGDP p.c. initial level, SVM ⁴⁸ , Log RGDP p.c., Investment Share, Government Consumption, Inflation Rate, Degree of Openness, Log Fertility Rate, Average Years of Schooling, Log Life Expectancy	Evidence from a novel measure of democracy (SVM ⁴⁸) based on Support Vector Machines highlights a robust positive relationship between democracy and economic growth. The transmission channels through which democracy exerts its influence on growth are that democratic countries have better educated populations, higher investment shares, lower fertility rates, but not necessarily higher levels of redistribution.
24.	J.A.Minier (1998)	35 countries (annual data), (5-year and 20-year period averages used) 96 countries (annual data) (Used only in R.T.A.)	1965-1987	Standard Growth Regression OLS-Growth Regression OLS with Control Groups per country of interest-Use of Predicted vs Actual Growth Rates-Indirect Effects of changes in democracy on education and investment are measured-Regression Tree Analysis (R.T.A.)	Avg. Annual RGDP p.c. Growth (%),Log RGDP p.c. initial level, Investment, Education, Log Fertility, Log Life Expectancy, Educational Spending, Government Consumption, Democracy, Democracy Squared, Civil Rights, Terms of Trade, Black Market Premium, Democracy Increase, Democracy Decrease	Countries that democratize are found to grow faster than a priori similar countries, while countries that become less democratic grow more slowly than comparable countries. Regression tree analysis indicates that democracy, along with initial income and literacy, is a significant variable in determining multiple-growth regimes. Human capital is more important for growth in more democratic countries while physical capital in less democratic ones.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
25.	L.J. Comeau (2003)	82 countries (annual data)	1972-1989	Basic Multivariate Regression Analysis, Panel OLS of an equation depicting the empirical counterpart of the extended neoclassical model	Avg. Annual RGDP p.c. Growth (%) PPP adjusted, Ln GDP initial level, Avg. growth rate of population, Avg. level of physical capital investment as % of GDP, Regime Type (avg. level of political rights, Gastil), Quadratic specification of Regime Type, Sociopolitical Instability (s.d. of Gastil series), Initial level of Gastil political rights per country, Initial Democratic Capital, Avg. level of Economic Freedom, Quadratic specification of Economic Freedom, Low-level human capital (% of population achieving basic schooling), High-level human capital (% of population achieving higher schooling), 5 regional dummies	Initial democratic capital, that is the political legacy of a country, is important to its future economic growth. Democratic types of political regime are more favorable for economic prosperity. A nonlinear relationship exists between growth and regime type. Sociopolitical stability is a necessary complementary condition for economic growth.
26.	Y. Feng (1996)	40 countries (SSA) (annual data)	1960-1992	Basic Regression Analysis, Panel OLS & 2SLS, of a basic multivariate statistical model depicting the impact on economic growth of a democracy	Avg. Annual RGDP p.c. Growth (%), Democracy index, Ln GDP initial level, Primary School Enrollment Rate 1960, Infant Mortality Rate 1960, Avg. ratio of Real Domestic Investment to RGDP, Inflation, Exports % GDP	The conclusion from this study is that the economy grows faster under a regime that enjoys a high level of institutionalized democracy and that there exists a positive feedback relationship between democracy and growth.
27.	J.C.Bluedorn (2001)	31-88 countries (annual data), (10-year period averages used)	1960-1990	SUR system estimating 3 equations where each equation is fitted for a particular decade 1960's, 1970's, and 1980's. The system is estimated four times, each using a larger set of independent variables.	Avg. Annual Decadal RGDP p.c. Growth (%), ELF, Democracy measure, Decadal intercepts, Regional dummies, Log decadal initial income, Log schooling, Assassinations, Log telephones/worker, Fiscal surplus/GDP, Financial depth-Black market-Exchange rate premium	This paper presents further empirical evidence supportive of democracy's positive role in ameliorating ethnic diversity. However, it also shows that endogeneity problems and some negative direct effects of democracy weaken the case for establishing democratic institutions as a policy solution for poor economic performance due to ethnic diversity.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
28.	A. Pourgerami (1988)	92 countries (annual data)	1965-1984	Regression (OLS) and Causality Analysis of several development-democracy-growth causality models constructed for this study as well as hypothesis testing with the use of contingency tables	Avg. Annual GNP ⁴⁹ p.c. Growth (%), Market, Development, Culture, Investment, Education, Democracy, Labor, Welfare	Development affects democracy directly and indirectly via education and investment. There is a positive causal association between democracy and growth which is transmitted both directly and indirectly via labor and welfare.
29.	R. Salahodjaev (2015)	93 countries (annual data)	1970-2013	Basic Regression Analysis and OLS-IV-RREG ⁵⁰ estimation of a model used to empirically investigate the interactive effect of democracy and intelligence on economic growth with several robustness regressions run in order to validate the results	Avg. Annual RGDP p.c. Growth (%), Democracy index, National IQ ⁵¹ , Ln RGDP p.c. initial level, Gross fixed capital formation (% of GDP), Average years of schooling at all levels, Population growth (annual %), Trade (% of GDP), General government final consumption expenditure (% of GDP)	The results show that the relationship link between democracy and the real GDP growth varies with a nation's level of cognitive abilities. The results remain robust to various estimation techniques, control variables and time periods.
30.	C.H.Knutsen (2013)	45 countries (SSA) (annual data)	1972-2004	The baseline Model I is an ordinary least squares regression with panel corrected standard errors (OLS PCSE), which utilizes both cross-national and inter-temporal variation for inference. Model II is a F.E. model to control for country-specific effects. Models III, IV & V are Arellano Bond Dynamic Panel Data Models which incorporate lagged growth as a regressor in order to simultaneously mitigate endogeneity and omitted variable bias	Avg. Annual RGDP p.c. Growth (%), Democracy Index, Bureaucratic Quality Index, Statehist5, Ln RGDP p.c. initial level, Ln regime duration, Ln population, ELF, Catholic (dummy), Protestant (dummy), Sunni (dummy), Indigenous religion (dummy), British colony (dummy), French colony (dummy), Portuguese colony (dummy), Belgian colony (dummy), 1970s (dummy), 1980s (dummy), 1990s (dummy)	The empirical analysis finds a positive and robust effect of democracy on growth in Sub-Saharan Africa, a continent historically characterized by weak-capacity states. Furthermore, the paper identifies a robust interaction effect between democracy and state capacity on growth, both in Africa and globally; the effect of democracy on growth increases when state capacity is reduced. Democracy is estimated to have a positive effect on growth in weak-capacity states, but not in high-capacity states. Additionally, the results indicate that state capacity enhances growth only in dictatorships.

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Index	Authors	Countries	Period	Method	Variables	Empirical Results
31.	J.B. Madsen, P.A. Raschky, A. Skali (2015)	141 countries (annual data)	1820-2000 1500-2000	A baseline model is estimated using pooled cross-section and time-series data where the dependent variable is per capita real GDP in purchasing power parity. Instruments are used for democracy and literacy because of likely feedback effects from income. The model is estimated using an unbalanced panel as far back for each country as the data are available. OLS Regressions are run for several models and the methods of estimation used are FE, 2SLS-FE, and the Arellano-Bond System GMM estimator. A second baseline growth model is estimated which allows for the influence of critical junctures using cross-section OLS regressions.	Ln RGDP p.c., Ln RGDP p.c. lagged Secondary Educational Attainment, Literacy Rate (%), Leader's Natural Death, Resource Dispersion, Democracy Index(Polity2), Linguistic Distance-Weighted Strength of Democracy, Vector of country dummies, Vector of Time dummies, Number of years in 1900 since the establishment of the first university divided by 100, Literacy (%), A measure of the constraints on the executive during the first ten years of independence, Year of Independence, Catholic measure (fraction), Protestant measure (fraction), Muslim measure (fraction)	Democracy is found to be a significant determinant of income and growth and the result is robust to various estimation methods and covariates. It is found that a one-standard deviation increase in democracy is associated with a 44–98% increase in per capita income.
32.	J. Fidrmuc (2003)	25 countries (CEE ⁵² & FSU ⁵³) (annual data) (5-year avg.)	1990-2000	A baseline growth model is estimated using cross-section OLS regressions with the GDP growth rate as the dependent variable. To capture the changes in the course of transition of the underlying model of growth, identical regressions have been estimated for a sequence of 5-year moving-window periods between 1990 and 2000.	Avg. Annual RGDP p.c. Growth (%), Democracy Index, Liberalization Index, Investment Ratio (%), Government Expenditure (%), Brussels (ths. ⁵⁴ km), Secondary School Enrollment, War Dummy, War Dummy Lagged, 1989 GNP p.c. (log ths. \$),	The results suggest that democracy reinforces progress in economic liberalization, which, in turn, improves growth. Hence, democratization had a positive effect on growth during transition, albeit indirectly, through facilitating economic liberalization.
33.	M.T. Rock (2009)	12 countries (East Asia) (annual data)	1960-2004	OLS-2 SLS fixed country and time effects panel regressions of democracy and autocracy on growth and investment.	Avg. Annual RGDP p.c. Growth (%), Regime dummies, Regime transition dummies, State Capacity Variables, Number of Veto Players, Gross Capital Formation (% GDP), Population growth rate, Government Consumption (% GDP), FDI (% GDP), Trade, Inflation, Control of Corruption, Regime Durability	Findings reject the democracy slows growth hypothesis and show that democracy causes growth and investment to rise.

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Index	Authors	Countries	Period	Method	Variables	Empirical Results
34.	E. Flachaire, C.G. Peñalosa, M. Konte (2014)	79 countries (annual data)	1975-2005	Standard Regression Models, Pooled OLS, FE & RE, Finite Mixture Regression Models	Avg. Annual RGDP p.c. Growth (%)-5yr. ⁵⁵ periods, Ln RGDP p.c. initial level, Ln of population growth, Ln of investment rate, Ln of initial average years of education of the total population aged over 25, Initial index of political institutions, Initial index of economic institutions, Index of political institutions in 1975, Index of economic institutions in 1975	Our results indicate that the data is best described by an econometric model with two growth regimes. Political institutions are the key determinant of which regime an economy belongs to, while economic institutions have a direct impact on growth rates within each regime. These findings support the hypothesis that political institutions are one of the deep causes of growth, setting the stage in which economic institutions and standard covariates operate.
35.	T. Persson & G. Tabellini (1992)	50 countries (annual data)	1960-1985	Standard Growth Regressions estimated with OLS on income distribution and on other explanatory variables	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Primary School Enrollment (% pop.), Agricultural Sector Labor Force (% total labor force), Gini coefficient for the distribution of land ownership, Democracy Index, Income Equality Measure	Income inequality is bad for growth in democracies, while land concentration is bad for growth everywhere.
36.	C. Wu (2012)	3167 country- years for autocracies and 1942 country- years for democracies (annual data)	1960-2001	Panel Data Models RE & FE and OLS PCSE	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Democratic Levels, Summed Hostility, War, Fuel and Ore p.c., ELF, Government, Investment, Saving, Coast, Tropical, Trade/GDP, Regional Dummies	The effects of democracy on economic growth, among other things, depend on the level of external threat as well as on the level of natural resource intensity.
37.	H. Zouhaier & K.M. Karim (2012)	11 countries (MENA) (annual data)	2000-2009	Dynamic Panel Data Model, GMM Arellano- Bond estimation method	Avg. Annual RGDP p.c. Growth (%), Growth Rate Lagged, Investment, Openness in Trade, Government Expenditures, Financial Development, Political Rights, Civil Liberties	The main findings derived from this empirical analysis reveal a positive impact of democracy on investment, a positive effect of civil liberties on economic growth, and a positive interaction between political rights and investment.

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Index	Authors	Countries	Period	Method	Variables	Empirical Results
38.	A. Alesina & D. Rodrik (1994)	70 countries (annual data)	1960-1985	Model of endogenous growth with distributive conflict among agents endowed with varying capital/labor shares. OLS and TSLS ⁵⁶ growth regressions.	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Primary school enrollment ratio 1960, Gini coefficient of income inequality 1960, Gini coefficient of land distribution inequality 1960, Democracy dummy, Literacy rate 1960, Infant mortality rate 1965, Secondary enrollment rate 1960, Fertility rate 1965, Africa dummy	The results indicate that inequality in income and land distribution is negatively associated with subsequent growth. Also, they show that democracies do not grow faster than or more slowly than dictatorships.
39.	A.M. Ali (2003)	112 countries (annual data)	1975-1994	Standard Growth Regressions based on the Solow neoclassical growth model as modified by Mankiw with the addition of human capital estimated with OLS on ICRG ⁵⁷ -BERI ⁵⁸ institutional variables and on other explanatory variables	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Avg. annual population growth rate, Avg. investment-GDP ratio, Initial school enrollment rate 1975, Economic freedom index, Avg. rate of government expenditure on GDP, Avg. inflation rate, Political Rights, Civil Liberties, S.D. of growth of domestic credit, Trade, Law, Repudiation of contracts risk, Expropriation of property risk, Quality of Bureaucracy index, Corruption index, Efficiency of Bureaucracy index, Enforcement of contracts index, Infrastructure quality index, Nationalization of private property risk	The empirical results reveal that countries with high levels of economic growth are characterized by high levels of economic freedom and judicial efficiency, low levels of corruption, effective bureaucracy, and protected private property. The results also indicate that economic freedom is an important determinant of growth and investment.
40.	A.M. Ali & W. M. Crain (2002)	119 countries (annual data)	1975-1989	EBA (Extreme Bound Analysis) on the coefficient of a set of core regression variables derived from a set of Standard Growth Regressions	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Share of investment in RGDP p.c., Avg. annual population growth rate, Avg. investment-GDP ratio, Initial secondary enrollment rate 1975, Economic freedom index, Avg. rate of government expenditure on GDP, Avg. inflation rate, Political Rights, Civil Liberties, S.D. of growth of domestic credit, Trade	Political regimes and civil liberties, as distinct from economic freedom, do not appear to matter systematically for growth. The quality of a country's economic infrastructure is not necessarily connected to its political regime or levels of civil liberties.

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Index	Authors	Countries	Period	Method	Variables	Empirical Results
41.	H. Almeida & D. Ferreira (2002)	138 countries (annual data)	1960-1990	Standard cross-country Growth Regressions estimated by OLS. IV Regressions. Country FE Growth Regressions.	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Investment rate, Government consumption, Government investment in education, Avg. number of years of enrollment in primary education, Avg. number of years of enrollment in secondary and higher education, Log of total population, Democracy index, Log of fertility, Log of life expectancy at birth, Terms of trade shock, Black market premium, OECD dummy, Urbanization rate, Resource dependence, Property rights index, Business regulation index, Ethnolinguistic fractionalization, Legal origin, Religion, Latitude, 6 Time dummies, 138 country dummies	Less democratic countries seem to have more variable growth rates and policies than more democratic ones.
42.	R.J. Barro (2000)	87 countries (annual data)	1965-1995	Standard Panel Growth Regressions based on the Solow neoclassical growth model as modified by Barro estimated with 3SLS on several instrumental variables	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Years of Schooling, Inflation rate, Democracy index, Rule of Law index, Government Consumption/GDP, Investment/GDP, Log Total fertility rate, Growth rate of terms of trade	Evidence from a broad panel of countries shows little overall relation between income inequality and rates of growth and investment. For growth, there is an indication that inequality retards growth in poor countries but encourages growth in richer places.
43.	D. Assane & A. Pourgerami (1994)	33 countries (10 CFA ⁵⁹ -23 SSA) (annual data)	1970-1989	Estimation of a cross-section and time-series empirical growth model with OLS regressions and SUR	Avg. Annual RGDP p.c. Growth (%), Population Growth, S.D. of Output Growth, Money Supply Growth, S.D. of Money Supply Growth, Inflation rate, S.D. of Inflation, Growth of Government Spending Share, Growth of Export Earnings Share, Growth of Investment Share, Lack of Civil Liberties, Oil Dummy, Calamity Dummy, CFA Dummy, Time Period Dummy	The results suggest that African economies have experienced similar growth trends, which were higher in the 1970s than in the 1980s. No significant differences exist between CFA and SSA economies. The results also suggest a positive impact on output growth by monetary expansion and capital formation and a negative one by inflation and government spending. A monetary union does not necessarily lead to faster growth.

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Index	Authors	Countries	Period	Method	Variables	Empirical Results
44.	M. Bleaney & A. Nishiyama (2002)	138 countries (annual data)	1965-1990	<p>Comparisons between alternative models by testing model adequacy and performing non-nested tests against an encompassing model derived from a pair of the following models under consideration: Barro, Easterly & Levine, and Sachs & Warner.</p> <p>Standard Growth Regression of the encompassing model by using a general-to-specific modeling procedure, successively eliminating the independent variable with the smallest t-statistic and re-estimating until each variable is significant at the 0.05 significance level.</p>	<p>Avg. Annual RGDP p.c. Growth (%) PPP adjusted, Log of Income per economically active person 1965, Openness dummy, Black Market Premium avg. 1970-1990, Male secondary-higher schooling 1965, Female secondary-higher schooling 1965, Financial depth avg. 1965-1990, Inflation rate avg. 1965-1990, Log Fertility rate 1965, Central government savings/GDP, Government consumption/GDP, Log Life expectancy 1965, Institutional quality, Assassinations per 1m persons, Democracy index, Terms of trade growth 1965-1990, Primary product exports/GDP, Tropical climate, Landlockedness, Economically active minus total population growth, Ethnic diversity, Fraction of GDP in mining, Rule of Law index, Saving ratio, Neighbor countries' growth</p>	<p>The results suggest that many of the new variables that have been introduced into growth regressions in the 1990's such as human capital, institutions (democracy), specialization in primary products, and terms of trade changes all seem to be important determinants of growth.</p> <p>There is also evidence of significant non-linearity in the relationship between income levels and finally, the data strongly prefer an encompassing model, but fail to reject any of the candidate models, implying that each model represents a partial truth.</p>
45.	M. Chatterji (1998)	81 countries (annual data)	1960-1985	Standard Panel Growth Regressions based on the Solow neoclassical growth model estimated with OLS on several explanatory variables	<p>Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Log secondary ed. enrollment rate 1960, Percent change of secondary enrollment rate 1960-1985, Log tertiary ed. enrollment rate 1960, Log Real Domestic Investment/RGDP, Percent change of tertiary enrollment rate 1960-1985, Political rights index, OECD dummy</p>	<p>The results suggest that tertiary education may well have an important role to play in the growth process. Tertiary education did displace secondary education as the major driver of growth.</p>
46.	P. Collier (2000)	94 countries (annual data)	1960-1990	Simple model of government choice between growth and redistribution empirically tested with standard growth regressions regressing growth on ethnic fractionalization and political rights estimated with OLS	<p>Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Log Population, Landlocked dummy, Political rights index, ELF index, Education, Corruption, Risk rating, Openness</p>	<p>The results show that ethnic diversity is only detrimental in the context of limited political rights. In dictatorships it is highly detrimental since a highly diverse society loses up to 3% of annual GDP growth.</p>

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Index	Authors	Countries	Period	Method	Variables	Empirical Results
47.	J.W. Dawson (1998)	85 countries (annual data)	1975-1990	Standard Panel cross-country Growth Regressions based on an extension of the human capital augmented version of the Solow neoclassical growth model estimated with OLS and 3SLS on several explanatory variables	Avg. Annual RGDP p.w. Growth (%), Ln RGDP p.w. initial level, Initial income, Investment share, Labor force growth, Human capital, Initial freedom, Change in freedom, Political Rights index, Civil liberties index, Economic freedom index, Initial political freedom, Change in political freedom, Initial economic freedom, Change in economic freedom, Initial civil freedom, Change in civil freedom	The empirical results indicate that free-market institutions have a positive effect on growth; economic freedom affects growth through both a direct effect on total factor productivity and an indirect effect on investment; political and civil liberties may stimulate investment; an important interaction exists between freedom and human capital investment; Milton Friedman's 5 conjectures on the relation between political and economic freedom are correct; promoting economic freedom is an effective policy toward facilitating growth and other types of freedom.
48.	D. Rodrik (1999)	104 countries (annual data)	1960-1989	OLS Regression Analysis including variables measuring latent social conflicts and external shocks	Growth differential between two sub-periods (1975-89, 1960-75), Regional Dummies, Lagged Growth 1960-75, Log GDP p.c. 1975, External Shocks measure, Income Inequality measure, Institutions (ICRG), ELF60, Democracy Index, Rule of Law, Participation, Bureaucratic Efficiency, No corruption, Log social spending	The study concludes that latent social conflicts and the institutions of conflict management matter to the persistence of economic growth and that their effects are measurable. Participatory and democratic institutions, the rule of law, and social insurance are all components of a strategy to enhance resilience to volatility in the external environment.
49.	A.A. Goldsmith (1995)	59 countries (annual data)	1988-1993	Standard Panel Growth Regressions based on the Solow neoclassical growth model estimated with OLS on several explanatory variables	Avg. Annual RGDP p.c. Growth (%), Gross Domestic Investment (% GDP1990), Exports (% GDP1990), Ex-socialist countries dummy, Political Rights Index (1992-93), Property Rights Index, Human Rights, Credit, Risk	The results show that political and property rights enhance economic growth. Democratic and free market rules are associated with faster growth in transitional countries.

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Index	Authors	Countries	Period	Method	Variables	Empirical Results
50.	J.B. Durham (1999)	105 countries (annual data)	1960-1989	Standard Growth Regressions GLS RE models	Avg. Annual RGDP p.c. Growth (%), Effective Party/Constitutional Framework (EP/CF), Log EP/CF, Square EP/CF, Log Initial GDP, Investment Ratio, Male Education Rate, Female Education Rate, Population Growth, Openness to Trade, Government Ratio, Regional Dummies	The results show that the effective party/constitutional framework measure does not correlate with growth or investment in the total sample. But considering development levels, some evidence indicates that discretion decreases growth in advanced areas, and, contrary to theory, inhibits investment in poorer countries. Also, single-party dictatorships have higher investment ratios but do not grow faster than party-less regimes.
51.	J.A. Minier (2003)	27 countries (annual data)	1960-1990	5-year panel growth regressions and 20-year cross-sectional regressions estimated with time and country fixed effects	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Investment, Education, Democracy Index, Fertility, Life Expectancy, Ed. Spending, Govt. Consumption, Black Market Premium, Terms of Trade, Civil Liberties Index, Democratic Movement Dummy, Repressed Dummy, Reluctant Conciliatory Dummy, Democratic Transition Dummy, Duration of democratic movement	The results show that democratic movements are negatively correlated with economic growth and government repression of those movements appears to some extent to cancel out these effects on growth.
52.	B. Fayissa & M. I. El-Kaissy (1999)	80 countries (annual data)	1971-1990	Use of an extended production function arising from the Lucas and Romer endogenous growth model. Cross-sectional Regressions-OLS estimates of the effects of foreign aid and human capital on economic growth.	Avg. Annual RGDP p.c. Growth (%), Avg. foreign aid (% GDP), Avg. gross domestic savings (% GDP), Avg. annual growth rate of labor, Avg. annual growth rate of real export values, Percent of pupils enrolled in vocational or teacher- training secondary school, Political and Civil stability index	The study shows that foreign aid has a statistically positive effect on economic growth in developing countries. Lack of political and civil liberties is found to have a negative, but statistically marginal impact on economic growth.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
53.	Y. Feng (1995)	19 countries (Latin America) (annual data)	1982-1988	Pooled Time Series Cross-section analysis- Standard Growth Regressions estimated with OLS and EGLS ⁶⁰	Avg. Annual RGDP p.c. Growth (%), Civil government dummy, Democracy dummy, Political Rights and Civil Liberties index, Institutionalized Democracy indicator, Political Rights Index, Civil Liberties Index, Annual Inflation Rate, Investment share of growth of GDP, Long-term gov. debt in real \$, Long-term priv. debt in real \$, Exports of goods and services in real \$, Real national income lagged, Percent of GDP Investment	The conclusion from this study is that the economy grows faster under a civilian rather than a military government and both political rights and civil liberties contribute to growth.
54.	R. Gounder (2002)	1 country (Fiji) (annual data)	1968-1996	Time series co- integration analysis (ARDL) based on a neoclassical Solow-type growth model. Statistical tests run: F- test, LM, RESET, JBN, ARCH	Annual growth rate of national income, Annual growth rate of effective labor force, Total investment to output ratio, Civil liberties and political rights index, Economic freedom index, Post-military coup dummy, Government revenue (% GDP), Defense expenditure to GDP share, Government consumptions as a ratio of GDP, Fiscal balance, Openness of trade	Empirical results support the view that democratic values and economic freedom are significant for growth. A statistical test for the endogeneity of democracy rejects reverse causality, and so democratic environment and economic freedom lead to higher economic growth. The results also indicate that military coups are detrimental to growth.
55.	E.L. Glaeser, R. La Porta, F. Lopez-De-Silanes, A. Shleifer (2004)	132 countries (annual data)	1960-2000	Standard Cross- sectional OLS Growth Regressions	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Executive Constraints, Democracy, Autocracy- Polity IV, Expropriation Risk, Autocracy-Alvarez, Government Effectiveness, Judicial Independence, Constitutional Review, Plurality, Proportional Representation, Years of Schooling, Primary School Enrollment, Legal Origin, Population Environmental Variables	The evidence suggests that human capital is a more basic source of growth than are institutions, poor countries get out of poverty through good policies, often pursued by dictators, and subsequently they improve their political institutions.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
56.	D. Landau (1986)	65 countries (annual data)	1960-1980	OLS standard growth regressions, based on a simple production function framework, with most of the regressors being lagged in order to avoid problems of contemporaneous correlation between the said regressors and the disturbance.	Avg. Annual RGDP p.c. Growth (%), Log RGDP p.c., Agriculture production (GDP share), Military expenditure (GDP share), General government educational expenditure (GDP share), Real exchange rate index 1960, Agricultural land p.c., Inflation rate, Private investment (GDP share), General government capital expenditure (GDP share), Official transfers from abroad (GDP share), Private transfers from abroad (GDP share), Current revenue (GDP share), Real interest rate, General government current non-consumption expenditure (GDP share), General government budget deficit (GDP share), Colony dummy, Coup index, Democracy dummy, Distance from capital of nearest seaport, Money supply % change, Terms of trade change, Avg. weighted total enrollment in school 1965-75, Avg. growth rate of world GDP, Life expectancy at birth 1970, Total Population, Manufacturing output (GDP share), Other industry output (GDP share), General government consumption expenditure other than defense and education, Oil production dummy, Political deaths index, Avg. population growth rate, World inflation rate, Avg. annual rainfall, War dummy, Time trend, Years of Independence, Population share of Europeans	The results show that democratic institutions, the incidence of coups, and a war having been fought on the country's soil all have negative effects on the growth rate of the economy. World economic conditions affect short run but not long run growth. Government consumption reduces growth. Foreign official aid has no effect on growth.
57.	M. Leschke (2000)	80 countries (annual data)	1990-1997	Factor analysis of the two factors that are regressed against growth and OLS regressions of the basic Milton Friedman model of production	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Economic freedom index, Political freedom index, HDI ⁶¹	The results show that the appropriateness of the framework in which the market operates and the degree of political interventions into the market process have great influence on the prosperity of nations.
58.	J.M. Mbaku (1994)	117 countries (annual data)	1970-1989	Standard Panel Growth Regressions based on a longitudinal research design estimated with OLS on several explanatory variables	Avg. Annual RGNP p.c. Growth (%), PQLI ⁶² , HDI, Political Democracy Index, Gross Domestic Investment (% GDP), Export Growth	The results show that democracy positively affects development as is measured by the alternative indicators, but it does not have any effect on growth in per capita income. Democracy affects growth in some societies and has no impact at all in others.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
59.	R. Levine, & D. Renelt (1992)	119 countries (annual data)	1960-1989	EBA (Extreme Bound Analysis) on the coefficient of a set of core regression variables derived from a set of Standard Cross-Country Growth Regressions	Growth RGDP p.c. (Summers & Heston), Growth RGDP p.c. (World Bank), Black market exchange rate premium (BMP), S.D. of BMP, Ratio of central gov. corporate income tax revenue to GDP, Ratio of central gov. defense expenditure to GDP, Ratio of central gov. educational expenditure to GDP, Growth rate of domestic credit (GDC), S.D. of GDC, Real gov. capital formation, Land area, Share of real gov. consumption expenditures without defense and education, Import share of GDP, Investment share of GDP, Real investment share of GDP, Central gov. gross capital formation, Share of central gov. individual income tax revenue to GDP, Real exchange rate distortion (RERD), RERD (Summers & Heston), Number of revolutions and coups per year, Growth of gov. consumption expenditures, Ratio of central gov. deficit to GDP, RGDP1960 p.c., Outward orientation dummy, Civil liberties, Primary school enrollment rate in 1960/1970, Socialist economy dummy, Secondary school enrollment rate in 1960/1970, Measure of overall trade intervention, Measure of overall trade openness, Literacy rate in 1960, Mixed gov. dummy, Growth of import share, Population growth, Ratio of import taxes to imports, Measure of openness based on import penetration, Gov. consumption share of GDP, Real gov. consumption share of GDP, Growth of the share of gov. consumption, OECD dummy, OPEC dummy, Avg. inflation of GDP deflator, S.D. of inflation, Population in 1970, Regional dummies, Growth of exports, Ratio of central gov. tax revenue to GDP, Growth of imports, Ratio of social security tax revenue to GDP, Ratio of total gov. expenditure to GDP, Ratio of total trade to GDP, Growth of export share of GDP, Ratio of central gov. export tax revenue to exports, Export share of GDP	The results show a positive robust correlation between growth and the share of investment in GDP and between the investment share and the ratio of international trade to GDP and no correlation with political rights.
60.	M.A. Nelson & R.D. Singh (1998)	67 countries (annual data)	1970-1989	Standard cross-country Growth Regressions estimated by OLS and period FE	Avg. Annual RGDP p.c. Growth (%), Investment expenditures (% GDP), Ln RGDP p.c. initial level, Civil liberties and Political rights index, Economic freedom index, Defense expenditures (% GDP), Government consumption (% GDP), Government revenues and grants (% GDP), Population growth	The results show that democracy is conducive to economic growth. Democracy is as relevant to growth in poor countries as economic freedoms are the same as in rich countries.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
61.	A.M. Mobarak (2005)	136 countries (annual data)	1960-2000	Model of average growth and volatility as a two equation system regressed on several explanatory variables and estimated with OLS and 3SLS and R.E.	Avg. Annual RGDP p.c. Growth (%), S.D. growth rate, IQR growth rate, Frequency of sign change of growth rate, Democracy indicator, Civil liberties index, Openness of political institutions, Competitiveness of political participation, Political constraints, (Imports+Exports)/GDP, Shock to merchandise terms of trade, External war dummy 1960-85, Services share of GDP, Exporters of diversified set of products indicator, Fuel exporters indicator, Log total population, Index of fraction of agriculture-industry-services share of GDP, School years male/female, Initial RGDP p.c., Black market premium in currency exchange, Antigovernment demonstrations per year, Inflation rate (%), Credit to private sector/GDP (%), Gini coefficient of income distribution, Gross domestic investment/GDP (%), Estimate of settler mortality, Muslim majority population country indicator, Independence gained after 1945 indicator	The results show that higher levels of democracy and diversification lower volatility, whereas volatility itself reduces growth. The democracy-stability link is robust.
62.	H. Pitlik (2002)	80 countries (annual data)	1975-1995	Standard cross-country OLS and IRLS growth regressions and EBA	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Economic freedom 1975, Liberalization, Policy volatility, Populations growth, Avg. investment 1975-92, Human capital, Avg. Political freedom, Conflict dummy 1985-94, Regional dummies, OECD dummy	The results show that a higher volatility of the liberalization path proves to be growth depressing and that growth performance is notably better if liberalization follows a smoother path.
63.	A. Pourgerami & D. Assane (1992)	47 countries (annual data)	1950-1985	Standard cross-country OLS growth regressions based on the Kormendi-Meguire model	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Avg. population growth rate, S.D. of real output growth, S.D. of real money supply shocks, Avg. money supply growth, Avg. growth of the ratio of gov. spending to output, Avg. growth of exports (% output), Avg. growth rate of inflation, Avg. ratio investment-income, Civil liberties	The impact of political freedom on economic growth is positive and significant. It is more pronounced than previously measured.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
64.	K.B. Grier & G. Tullock (1989)	113 countries (annual data)	1951-1980	Pooled Cross-Section Time Series Regressions on five-year averaged data and Population-weighted Regressions for 4 sub-samples based on an extension of the Kormendi-Meguire Growth Model	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Growth Government GDP share, S.D. GDP Growth, Population Growth, Inflation, Change in Inflation, S.D. of Inflation, 5 Year Period Dummies, OPEC Dummy, Lack of Civil Liberties Dummy	The results show that political repression is negatively correlated with economic growth in Africa and Central and South America.
65.	H.S. Esfahani & M.T. Ramirez (2003)	75 countries (annual data)	1965-1995	IV/2SLS Regression Analysis of a Model of output and infrastructure growth	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Population Growth Rate, Log Initial Telephones p.c., Growth Rate of telephones p.c., Private ownership telecoms sector, Log Initial Power Production p.c., Growth Rate of Power Production p.c., Private Ownership in Power Sector, Avg. Years of Secondary Education, Log of Investment (% GDP), Terms of Trade Change, Democracy Score, ELH, Centralization, Democracy X ELH, Contract Enforcement, Gini Coefficient, Log Population Density, Urbanization, Share of Industry in GDP, Log (1+ exchange rate black market premium), Log Life Expectancy at Birth, Landlocked	The results show that institutional capabilities that lend credibility and effectiveness to government policy play particularly important roles in the development process through infrastructure growth.
66.	W. Wu & O.A. Davis (1999)	100 countries (annual data)	1975-1992	Log linear models are applied to categorical data and are used to analyze contingency tables and find the goodness of fit for the best model which is chosen by the use of the forward selection and backward elimination process	Level of Income RGDP p.c. (1975,1980,1985,1990), Growth rate RGDP p.c. (1975-80,1980-85,1985-90,1990-92), Political Freedom measure, Economic Freedom measure	The results show that given economic freedom, the rate of economic growth is independent of political freedom and the level of income whereas given the level of income, political freedom is independent of economic freedom and the growth rate.
67.	S. Kosack (2003)	130 countries (annual data)	1974-1985	Quality of life growth model similar to a neoclassical endogenous economic growth model estimated with OLS & 2SLS	Growth in quality of life (HDI), Initial quality of life, Arms imports (lagged), Institutional quality, Region Dummies, Period Dummies, Inflation, Budget Surplus, Openness, Terms of Trade, Democratization, Aid/GDP, Aid/GDP X democratization	The results show that aid increases quality-of-life growth in democracies and decreases it in autocracies. It also seems democracies, absent aid, have lower quality-of-life growth than autocracies.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
68.	J. de Haan & C.L.J. Siermann (1995)	110 countries (annual data)	1961-1992	EBA of the robustness of the relationship between democracy and economic growth on a Leamer, Levine & Renelt type growth model and OLS Regression Analysis	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Avg. Investment share to GDP, Secondary School Enrollment 1960, Avg. Population Growth, Avg. Ratio of Real Government Consumption to GDP, Avg. Inflation Rate, Avg. Ratio of Exports to GDP, Political Regime Index	The main conclusion of this study is that the relationship between democracy and growth is not robust. Regime stability is also not robustly related to economic growth. Although it is possible to find significant relationships, these are not robust. Adding one or two other variables is generally enough for the coefficients to become insignificant.
69.	R.C. Kormendi & P.G. Meguire (1985)	47 countries (annual data)	1950-1977	Cross-sectional specification of a simple growth model where the mean growth of real aggregate output in country j is regressed (OLS) on a vector of explanatory variables including civil liberties based on certain macroeconomic hypotheses	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Avg. population growth rate, S.D. of real output growth, S.D. of money supply shocks, Avg. money supply growth, Avg. growth of the ratio of gov. spending to output, Avg. growth of exports (% output), Avg. growth rate of inflation, Avg. ratio investment-income, Civil liberties	The results show a marginal effect of civil liberties (democracy) on growth and a dramatic effect on investment.
70.	M.J. Gasiorowski (2000)	49 countries (annual data)	1968-1991	OLS Regression Analysis with two-way FE models based on a panel research design in which annual time series from a cross-section of countries are stacked on top of one another in a single data set and analyzed jointly.	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Democracy, Fiscal Deficit/GDP, Money Supply Growth, Real Wage Growth, Employment Growth, Domestic Investment, Foreign Investment/GNP, Violent Unrest, Peaceful Unrest, Trade Deficit/GNP, School Enrollment, Inflation All of the above are lagged by 1 year except democracy which is lagged by 2 years.	The results show that more democratic countries have higher inflation and slower growth than less democratic countries. New and mature democracies do not have significantly different inflation and growth rates.
71.	A. Libman (2012)	79 regions (Russia) (annual data)	2000-2004	OLS and TSLS Regression Analysis of a set of panel data based on a basic empirical growth model, use of instrumental variables and robustness checks with FE & RE as well as 3SLS	Avg. Annual RGRP p.c. Growth (%), Ln RGRP p.c. initial level, Oil and Gas, Education, Openness, FDI, Investments, Health, Temperature, Regional Dummies, Democracy, Democracy Squared, Bureaucracy	There is evidence of a non-linear relationship between democracy and economic growth. Regions with high levels of democracy, as well as strong autocracies, perform better than hybrid regimes.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
72.	J. Kriekhaus (2006)	85 countries (annual data)	1960-2000	OLS Regression Analysis on CS ⁶³ Data Models & Pooled TSCS ⁶⁴ Data Models followed by sensitivity analyses	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Ln Life Expectancy, Education, Population Growth, Climate, Institutions, Democracy, Trade Openness, Government Spending, Labor Force, Initial GDP squared, Investment	The results show that democracy has no influence on economic growth. The main conclusion of this study is that democratic governance constrains growth in Latin America and Asia yet facilitates growth in Africa. Sensitivity analyses indicate that these findings are fairly robust.
73.	M.A. Baum & D.A. Lake (2003)	128 countries (annual data)	1967-1997	Recursive Regression Analysis of Indirect Effect of Democracy on Growth by the use of 2 equations on TSCS Data Models and the use of country-specific FE on all models	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Democracy, Labor Force, Female Life Expectancy, Female Secondary Enrollment, Investment, Population	The results show that democracy has no statistically significant direct effect on growth but rather it has a largely indirect effect on growth through increased life expectancy in poor countries and increased secondary education in non-poor countries.
74.	Y. Feng (1997)	96 countries (annual data)	1960-1980	OLS Regression Analysis on a single Growth equation and Joint Estimation of Growth, Democracy and Government Change with 3SLS Regression Analysis	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Initial Elementary School Enrollment Rate, Initial Investment Level, Inflation, Trade, Democracy, Irregular Change, Major Regime Change, Minor Regime Change	The results show that democracy has a positive indirect effect upon growth through its impacts on the probabilities of both regime change and constitutional government change from one ruling party to another. It promotes macro-political certainty and micro-political adjustability which leads to sustainable economic growth.
75.	D.P. Quinn & J.T. Woolley (2001)	109 countries (annual data)	1974-1989	OLS Regression Analysis on a Barro based cross-sectional growth model followed by EBA to assess the robustness of the results	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Growth Volatility (1974-89), Investment, Population Growth, Secondary School Enrollment, Primary School Enrollment, Trade Openness, Index of Democracy, Change in Democracy Index (1974-89), Government Consumption, Growth of Government Share, Revolutions/Coups, Political Instability Index (1974-89), Growth of Domestic Credit, S.D. of Domestic Credit, Export Share Growth, Regional Dummies	The results show that when growth and volatility are jointly examined, democracies reveal highly favorable economic results. However, democracy is not a robust correlate of economic growth.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
76.	X.X. Sala-i-Martin (1997)	119 countries (annual data)	1960-1992	CDF ⁶⁵ Analysis on the beta coefficient of a set of core regression variables derived from a set of Standard Cross-Country Growth Regressions	Avg. Annual RGDP p.c. Growth (%), Equipment Investment, Number of years open economy, Fraction Confucian, Rule of Law, Fraction Muslim, Political Rights, L.A. ⁶⁶ Dummy, S.S.A. Dummy, Civil Liberties, Revolutions and Coups, Fraction of GDP in Mining, S.D. Black Market Premium, Primary Exports 1970, Degree of Capitalism, War Dummy, Non-Equipment Investment, Absolute Latitude, Exchange Rate Distortions, Fraction Protestant, Fraction Catholic, Fraction Buddhist, Spanish Colony	The results show that a substantial number of variables including civil liberties are found to be strongly related to growth.
77.	M. Lundberg & L. Squire (2003)	49 countries (annual data)	1960-1997	Pooled OLS (SURE), IV (3SLS), Keane and Rankle 3SLS on a base growth model, a structural growth model, and a quasi-reduced-form growth model	Avg. Annual RGDP p.c. Growth (%), Gini coefficient, Education, M2/GDP, Inflation, Gov. Exp./GDP, Terms of Trade change, S-W openness index, Civil Liberties, Mean Land Gini, Initial GDP p.c., 1980s Dummy, 1990s Dummy, Initial Education, Initial Gov. Exp., Initial Inflation, Initial M2/GDP, Initial Terms of Trade change, Initial Civil Liberties, Initial S-W openness, Lagged Terms of Trade change, Population, Urban share of population, Ln life expectancy at birth, Ln total fertility rate, Initial female literacy rate, Initial democracy, Mean arable area, Oil exporter dummy, Commodity exporter dummy, British-French-German-Scandinavian legal origin	The main result is to show that the determinants of growth and inequality are not mutually exclusive. Another result is that improving income distribution through enhancing civil liberties may have deleterious consequences for growth.
78.	P. Collier (1999)	23 countries (annual data)	1960-1990	Basic OLS Regression Analysis of economic growth on ethnic fractionalization and democracy	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Ln Population, Landlocked, ELF, Political Rights	The main result is that democracy raises the growth rate while ethnic fractionalization reduces it.
79.	W.K. Farr, R. A. Lord, J. L. Wolfenbarger (1998)	98 countries (annual data) (5-year avg.)	1980-1990	Basic OLS Regression Analysis of economic growth on Political and Economic Freedom using 9 equations set up to measure the Granger Causality of the 3 main variables on each other	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level lagged, Political Freedom, Economic Freedom, country dummy variables	The results indicate that the level of economic well-being Granger-causes political freedom while no reciprocating evidence is found that political freedom Granger-causes the level of economic well-being, implying a univariate line of causation.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
80.	W.J. Henisz (2000)	157 countries (annual data)	1960-1994	Use of a simple spatial model of political interaction between different branches of government with veto power in economic decisions and estimation of the variable derived from this model with OLS, 3SLS, and GMM	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level lagged, Male Secondary Education (years), Female Secondary Education (years), Log Life Expectancy, Log Fertility Rate, Government Consumption (% GDP), Log Black Market Exchange Premium, Change in the Terms of Trade, Total Investment (% GDP), Log Law & Order Index, No. of changes in the Identity of the Executive, Democracy Index, Political Constraint Index	The derived political interaction variable is found to have statistically and economically significant impact on growth rates.
81.	U. Heo & A. C. Tan (2001)	32 countries (annual data)	1950-1982	Use of the direct Granger Causality Method	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level lagged, Democracy Index	The results are unclear about the causal relationship between economic growth and the level of democracy.
82.	K. L. Gupta (1988)	47 countries (annual data)	1950-1977	Use of the Kormendi-Meguire model disaggregated in 2 groups of developed and developing countries	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Avg. population growth rate, S.D. of real output growth, S.D. of money supply shocks, Avg. money supply growth, Avg. growth of the ratio of gov. spending to output, Avg. growth of exports (% output), Avg. growth rate of inflation, Avg. ratio investment-income, Civil liberties	The results of this study show that there are fundamental differences in the macro-determinants of growth in the developing and the developed countries.
83.	D.K. Gupta, M. C. Madhavan, A. Blee (1998)	120 countries (annual data)	1965-1986	Basic Pooled Time Series OLS Regression Analysis on 5 equations with 5 different dependent variables regressed on the rest of the variables	Avg. Annual RGDP p.c. Growth (%), Democracy Index, Communist Dummy, Coercion applied by democratic countries, Gap between expected and observed levels of democracy, Coercion applied by non-democratic countries, Enrollment in primary education, Size of the government sector, Percentage of government sector to the GDP, Average national investment as a percentage of GDP, Dummy variable for Latin American countries, Dummy variable for Middle Eastern countries, Openness (export + import as a percentage of GDP), Political violence, Political violence in the year prior to the three study periods, Ratio of income shares of the top 20% to the bottom 20% of the population, Rate of growth of GDP per capita, Dummy variable for South Asian countries, Dummy variable for Southeast Asian countries, Dummy variable for Sub-Saharan African countries (excluding South Africa), Ratio of a nation's per capita GDP to the US GDP	The estimated results indicate that democracy is more conducive to economic growth, at least in the long run.

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Index	Authors	Countries	Period	Method	Variables	Empirical Results
84.	D.A. Leblang (1997)	70 countries (annual data)	1960-1989	OLS estimation of economic growth models	Avg. Annual RGDP p.c. Growth (%) Decadal, Ln RGDP p.c. initial level, Democracy Index, Primary School Index (% over total population), Secondary School Index (% over total population), Regulation of chief executive Index, Competitiveness of chief executive election Index, Openness of executive recruitment Index, Executive Constraints Index, Revolutions/Coups Index	Results show that a nation's initial level of democracy has a significant and positive effect on its subsequent rate of growth.
85.	S. Knack & P. Keefer (1995)	97 countries (annual data)	1974-1989	Use of the Barro Growth Model estimated with OLS	Avg. Annual RGDP p.c. Growth (%), Avg. annual private investment/GDP, Ln RGDP p.c. 1970, Democracy Index, Avg. annual government consumption/GDP, Absolute value of deviation of investment price level (relative to U.S. level) from sample mean, Deviation of investment price level (relative to U.S. level) from sample mean, ICRG variables, BERI variables	One conclusion is that institutions that protect property rights are crucial to economic growth and to investment and so democracy has an indirect effect on growth.
86.	M. Lindenberg & S. Devarajan (1993)	93 countries (annual data)	1973-1988	Use of a FE model of GDP growth and regime type	Avg. Annual RGDP p.c. Growth (%), Investment/GDP, Inflation, Current Account/GDP, Democracy Dummies	The results showed that democracies in developing countries actually demonstrated stronger economic performance than their authoritarian counterparts.
87.	H. Li & H. Zou (1998)	46 countries (annual data)	1947-1994	FE & RE estimation of an extension of the Alesina and Rodrik baseline regression model	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Democracy Index, Gini Index, Urbanization Ratio, Population Growth Rate, Financial Development (M2/GDP), Openness (Exports/GDP), Domestic Investment shares of GDP, Black Market Premium, Primary School Enrollment Ratio	The results have shown that income inequality is positively, and very often even significantly, associated with economic growth.
88.	E. Miguel, S. Satyanath, E. Sergenti (2004)	41 countries (Africa) (annual data)	1981-1999	OLS, IV-2SLS, IV-2SLS FE estimation of economic growth models	Avg. Annual RGDP p.c. Growth (%), Avg. Annual RGDP p.c. Growth (%) lagged, Ln RGDP p.c. initial level, Civil Conflict Indices, Annual Rainfall (mm) GPCP measure, Annual Growth in Rainfall, Annual Growth in Rainfall Lagged, Democracy Level Lagged, Democracy Indicator Lagged, ELF, RF ⁶⁷ , Oil-Exporting Country, Log Mountainous, Log National Population Lagged, Trade Growth	Using rainfall shocks as instrumental variables for economic growth, the results show that growth shocks have a dramatic causal impact on the likelihood of civil war regardless of the political regime in place.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
89.	P.H. Mo (2000)	83 countries (annual data)	1970-1985	IV-2SLS estimation of economic growth models based on a total factor productivity framework developed by the author	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, GINI coefficient, Year the GINI coefficient is calculated, Private Investment/GDP, Population Growth Rate, Gastil Index of Political Rights, Measure of Political Instability, Avg. schooling years in the total population over age 25, Government Transfers/GDP, Regional Dummies	The study concludes that income inequality has significant negative effect on the growth rate.
90.	P.H. Mo (2001)	46 countries (annual data)	1970-1985	OLS estimation of economic growth models based on a total factor productivity framework developed by the author	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Corruption Index, Private Investment/GDP, Population Growth Rate, Gastil Index of Political Rights, Measure of Political Instability, Avg. schooling years in the total population over age 25	The results show that a 1% increase in the corruption level reduces the growth rate by about 0.72%. The most important channel through which corruption affects economic growth is political instability, which accounts for about 53% of the overall effect.
91.	M. A. Oliva & L. A. Rivera-Batiz (2002)	119 countries (annual data)	1970-1994	Use of a benchmark growth model applicable to developing countries estimated in several different combinations of equations with different variables with OLS, 3SLS	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Schooling, Government Consumption, Investment, FDI, KF ⁶⁸ , OKF ⁶⁹ , TOT-TOT ⁷⁰ (-1), Democracy Index, Rule of Law, Regional Dummies, Chronological Dummies, Log Black Market Premium, Log Inflation, Avg. Capital Growth, Avg. Bank Assets, Avg. Private Credit	The direct growth effects of democracy are positive and often statistically significant. There is also evidence that democracy has indirect growth effects that work by encouraging schooling and that the rule of law influences growth indirectly by encouraging foreign direct investment.
92.	T. Persson & G. Tabellini (1994)	9 countries (highly-industrialized) (20 yr. intervals) 56 countries (annual data)	1830-1950 1960-1985	Use of a theoretical model that relates equilibrium growth to income inequality and political institutions. Standard Growth Regressions estimated with OLS & 2SLS on income distribution and on other explanatory variables.	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Share in personal income of the top 20 percent of the population, Share of the enfranchised age and sex group in the population that is not in the electorate, Schooling Index, GDPGAP, Share in income of the third quintile, Share of the relevant age group attending primary school, Democracy Dummy	The main theoretical result is that income inequality is harmful for growth. Empirical results show that equality affects growth by promoting investment, and this effect is present only in democracies.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
93.	A. Pourgerami (1992)	104 countries (annual data)	1965-1984	3SLS estimation of a system of simultaneous equations of 3 over-identified equations of development-democracy-growth that include 3 jointly determined and 8 predetermined variables	Growth (DRR ⁷¹), Growth (GDP), Democracy, Freedom, Human Rights, Development (PQLI), Development (GNP), Stability, Religion, Industrialization, Family, Self-Determination	The effects of Democracy, Freedom, or Human Rights on Growth are positive and significant in equations where the DRR is the dependent variable. When Growth is measured by the GDP growth rate, only coefficients of the Human Rights variable are significantly different from zero.
94.	K.L. Remmer (1990)	11 countries (S. America + Mexico) (annual data)	1982-1988	Statistical Analysis of pooled data	Avg. Annual RGDP p.c. Growth (%), Log Annual % change in Rate of Inflation, Rate of Change Debt/Exports, Rate of Change Gov. Deficit/GDP, Real Wages (annual % change), Unemployment Rate, Debt/Exports, Interest Payments/Exports, Annual % change purchasing power of exports, 1982 Debt/Export	The results although mixed do provide some basis for arguing that a shift to democracy can actually strengthen, rather than weaken, the capacity to cope with economic challenges.
95.	R. Perotti (1996)	67 countries (annual data)	1960-1985	OLS & 2SLS estimation of economic growth models	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Share in income of the third and fourth quintiles 1960, Share in income of the third quintile 1960, Avg. years of secondary schooling of the male population 1960, Avg. years of secondary schooling of the female population 1960, PPP value of the investment deflator (U.S.A.) 1960, Avg. share of gov. expenditure on social security and welfare in GDP, Avg. share of gov. expenditure on health and housing in GDP, Avg. share of gov. expenditure on education in GDP, Avg. marginal tax rate, Avg. share of labor taxation in GDP, Avg. share of income taxes in personal income, Urbanization Rate 1965, Avg. share of population over 65, Avg. male secondary school enrollment ratio, Avg. female secondary school enrollment ratio, Avg. net fertility rate, Life expectancy at birth 1960, % of the population belonging to the main ethnic or linguistic group, Indices of sociopolitical instability, Democracy Dummies, Regional Dummies, Rich country Dummy	The results link income distribution to sociopolitical instability and to the education/fertility decision.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
96.	G.W. Scully (1988)	115 countries (annual data)	1960-1980	OLS regressions relating the separate effects of institutional variables on economic growth	Avg. Annual RGDP p.c. Compound Growth (%), Compound growth rate in the capital-labor ratio, Politically Open Dummy, Politically Closed Dummy, Individual Rights Dummy, State Rights Dummy, Free Market Dummy, Command Economy Dummy	The results showed that the institutional framework has significant and large effects on the efficiency and growth rate of economies.
97.	J. Svensson (1999)	58 countries (annual data)	1970-1994	OLS & IV-2SLS pooled cross-country growth regressions	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Democracy Index, Regional Dummies, Aid Index, Arm Imports/Total Imports, Religious Indices, Distortion Index, Financial Depth Index, FZ ⁷² Dummy, Education Gap Index, Log Total Population 1970, ELF Index, Fiscal Surplus/GDP, Schooling Index, Policy Index	The results show that the long-run growth impact of aid is conditional on the degree of political and civil liberties in the recipient country. Aid has a positive impact on growth in more democratic countries.
98.	L. A. Rivera-Batiz (2002)	59 countries (annual data)	1960-1990	OLS estimation of cross country economic growth models based on a total factor productivity framework developed by the author	Avg. Annual RGDP p.w. Growth (%), Capital Stock per worker, Democracy Index, Avg. yrs. of schooling (population over 15), Avg. proportion of 1960-90 population attending tertiary education (over 15), Governance Index, Urbanization Index (1980), Log of 1960-90 change in Capital Stock per worker	The results show that democracy is in fact a significant determinant of total factor productivity (TFP) growth between 1960 and 1990 in a cross-section of countries. Democracy influences growth mainly through its strong positive effects on the quality of governance.
99.	E. Weede (1983)	94 countries (annual data)	1960-1979	Cross-national and cross-sectional multiple OLS regression analysis	Avg. Annual RGDP p.c. Growth (%), Ln RGNP p.c. initial level, Avg. Annual RGNP p.c. Growth (%), Democracy Index, Ln RGNP p.c. initial level squared, Primary School Enrollment 1960, Secondary School Enrollment 1960, Gross Domestic Investment (% GDP), Military Participation Ratio Index	The overall effect of political democracy on economic growth is negative, but rather weak.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
100.	E. Weede (1993)	129 countries (annual data)	1975-1986	Simple Panel OLS regression analysis	Avg. Annual RGNP p.c. Growth (%) 1980-87, Ln RGNP p.c. 1980, Ln RGNP p.c. 1980 squared, Secondary School Enrollment 1980, Gross Domestic Investment (% GDP), Regime Repressiveness 1980-86, Nearly Stable Regime Repressiveness 1980-86, Stable Regime Repressiveness 1980-86,	There are no significant effects of democracy or repressiveness on either the quality of life, or income inequality, or economic growth rates.
101.	B. L. Chen (2003)	43 countries (annual data)	1970-1992	OLS long-run growth regressions	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Physical Capital Input, Human Capital Input, BMP, Government Consumption (share of GDP), Inflation Rate, Civil Liberties Index, Regional Dummies, GINI coefficient, Year the GINI coefficient is calculated	The results show an inverted-U relationship between income distribution and long-run economic growth.
102.	E. Papaioannou & G. Siourounis (2008)	166 countries (annual data)	1960-2003	Pooled cross-sectional OLS estimates with Time FE and Country FE of 7 variations of the benchmark difference-in- difference growth model to check for unconditional effects of permanent democratizations and use of an ARDL model to check for conditional effects of democratization	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level (PPP), Democratization Dummy, Gross Capital Formation/GDP, Avg. yrs. schooling of population over 25, Life Expectancy at Birth, Government Consumption (share of GDP), Trade [(Imports+Exports)/GDP], Socialist Indicator	The panel estimates imply that on average democratizations are associated with a 1% increase in annual per capita growth. The dynamic analysis reveals that: while during the transition growth is slow, in the medium and long run it stabilizes at a higher level.
103.	J. L. Butkiewicz & H. Yanikkaya (2006)	100 countries (annual data)	1970-1999	SUR/3SLS Panel cross- country growth regressions of an empirical growth model	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Log Life Expectancy Rates, Telephone mainlines/worker, Trade(% GDP), Rule of Law Dummy, Gov. Repudiation of Contracts Dummy, Risk of Expropriation Dummy, Corruption Dummy, Bureaucratic Quality Dummy, Political Rights Dummy, Civil Liberties Dummy, Democracy Dummy, Autocracy Dummy, Political Regime Dummy, Regional Dummies, Secondary Enrollment Ratios, ELF Index	The results show that countries with democratic institutions do enjoy superior growth performance especially developing ones.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
104.	S. Santhirasegaram (2007)	70 countries (annual data)	2000-2004	Simple Pooled OLS regression Analysis of a neoclassical growth model	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Avg. Investment Expenditure (% GDP), Avg. Tertiary Education Enrollments (% Gross Enrollments), Democracy Index (Polity IV), Economic Freedom Index (Heritage Foundation)	The results show a negative relationship between democratic freedom and growth.
105.	C.H.Knutsen (2015)	184 countries (annual data)	1825-2008	OLS PCSE-FE 2SLS- RE 2SLS Regressions of a baseline growth model in different specifications	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Log Population, Log (Regime Duration+1), Polity Index, ELF Index, Regional Dummies, Country Dummies, Decade Dummies, Year Dummies, Colonization Dummies, Plurality of Religion Dummies	The study reports robust evidence that democracy increases not only technology- induced growth but also net economic growth rates.
106.	S. Commander & Z. Nikoloski (2011)	159 countries (annual data)	1960-2009	GMM, OLS & FE Regression Analysis of a growth model	Avg. Annual RGDP p.c. Growth (%), Lagged Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level (PPP), Life Expectancy, Trade Openness, Inflation, Population, Gross Secondary School Enrollment, Government Expenditure, Democracy (FH), Democracy Sq. (FH), Polity, Polity Sq., Polity Transformed, Polity Transformed Sq., Regime Durability, Democracy (Cheibub), Interaction between Polity and Durability	The results showed that none of the explanatory variables for political institutions were significant for growth.
107.	K. Jamali K. Wandschneider P. V. Wunnava (2007)	92 countries (annual data)	1990-1999	Pooled cross-section time series analysis of a new neoclassical growth model checked in 2 specifications estimated with OLS Regressions	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level (1995 U.S. \$), Gross Secondary School Enrollment, Computers per 1000 people, Domestic Credit to Private Sector (% GDP), Autocracy Dummy, Democracy Dummy, Bureaucracy Dummy	The results suggest that democracies and bureaucracies significantly outperform autocracies in economic growth.
108.	T. Gylfason (2008)	164 countries (annual data)	1960-2000	OLS cross-country regressions of a basic growth model in different specifications	Avg. Annual RGDP p.c. Growth (%), Initial Level GNI p.c., Natural Capital Share, Natural Capital per person, Democracy Index, Log Investment Rate, Log School Life Expectancy, Fertility, Subsoil Asset Share, Subsoil Assets per person	The results show that political diversification is good for growth because it redistributes political power from narrowly based ruling elites to the people, thus in many cases replacing an extended monopoly of often ill-gotten power by democracy and pluralism. Diversity is good for growth.

Table 1 continued: Literature review of studies concerning Democracy & Economic Growth

Index	Authors	Countries	Period	Method	Variables	Empirical Results
109.	J. T. Jalles (2010)	86 countries (annual data)	1960-2005	Simple Pooled OLS-FE-TSLS regression analysis of a growth model based on a large panel	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Primary School Enrollment, Secondary School Enrollment, Higher Education School Enrollment, Democracy Index, Autocracy Index, Polity2 Index, Political Instability Index, Openness, Investment (GFCF ⁷³), Democracy X rich, Democracy X poor, Polity2 X rich, Polity2 X poor, Sustained Democratic Transition, Sustained Autocratic Transition, Small Regime Changes, Regime Durability, Latitude, Ethnic Fragmentation	The results show a positive and statistically significant effect of democracy and human capital on economic growth. A final conclusion can be reached that electoral democracy, by itself, increases GDP growth per capita while almost no support is found for the hypothesis that autocracy, by itself, increases it.
110.	A. Aisen & F. J. Veiga (2013)	169 countries (annual data)	1960-2004	System GMM estimations of linear dynamic panel models based on a dynamic growth model	Avg. Annual RGDP p.c. Growth (%), Ln RGDP p.c. initial level, Investment (% GDP), Population Growth, Primary School Enrollment, Trade Openness (% GDP), Cabinet Changes, Inflation Rate, Government (% GDP), Economic Freedom Index, Ethnic Homogeneity Index, Polity IV, Physical Capital Growth, Log Physical Capital p.c., TFP Growth, Log TFP, Human Capital Growth, Log Human Capital p.c., Regime Instability Indices, Violence Indices, Legal Structure and Security of Property Rights	The results show that higher degrees of political instability are associated with lower growth rates of GDP per capita. Political instability adversely affects growth by lowering the rates of productivity growth and, to a smaller degree, physical and human capital accumulation. Finally, economic freedom and ethnic homogeneity are beneficial to growth, while democracy may have a small negative effect.
111.	J. R. Pozuelo A. Slipowitz G. Vuletin (2016)	171 countries (annual data)	1960-1996	Pooled cross-sectional OLS estimates with Time FE and Country FE of several variations of the benchmark growth model	Avg. Annual RGDP p.c. Growth (%), Bureaucracy Quality Index, Checks and Balances Index, Contestation in a Democracy Index, Democratization Dummy, Democratic Accountability Index, Economic Complexity Index, E-timi ⁷⁴ , Education, Empowerment Rights Index, Gini Index, Government Spending (% GDP), Life Expectancy at birth, HDI, Inclusiveness in a Democracy, Gross Capital Formation (% GDP), Polity2, NAVCO ⁷⁵ , Openness, Physical Integrity Rights Index, TFP, Terms of Trade, World Press Freedom Index	The results show that the behavior of economic growth following exogenous democratizations strongly indicates that democracy does not cause growth. Consequently, the common positive association between democracy and economic growth is driven by endogenous democratization episodes.

3. Econometric Methodology

3.1 Methodology of Meta-Analysis

This paper has as its main objective to investigate the existence of a real association between democracy and economic growth and whether there is indeed an inconclusive association as many authors assert. Second, it investigates the presence of publication bias and assesses its impact on the analysis. Finally, it explores the sources of heterogeneity in the published results. Why are there such seemingly divergent results reported among different studies? Where does the heterogeneity of results come from? Does it come from the data-generating process, the research design process or is it unexplained? If it comes from the data-generating process then this implies that there is an underlying distribution of democracy-growth population parameter values which are negative in certain situations and positive in others. If it comes from the research design process then this implies that reported differences result from issues, such as differences in econometric specification. Lastly, if it is unexplained then this means that we probably still need to further analyze our data with different models based on different combinations of covariates until we find a satisfactory explanation.

In order to identify the magnitude of the democracy growth association, we calculate a mean democracy growth effect from the literature and construct 95% confidence intervals around this mean. This measure is the weighted average of a *standardized* democracy-growth effect derived from each study. In this paper, the partial correlation is used as the standardized effect. Partial correlations measure the impact of democracy on growth keeping other factors constant⁷⁶. They can also be used for meaningful comparisons across studies. An alternative would be to use elasticities, but many studies do not provide enough information from which to calculate the respected elasticities.

It is also prudent to weight the partial correlations. A standard weight in meta-analysis is the sample size of the regression from which the partial correlation is derived, as sample size affects the amount of information that is offered. The weights used in our meta-analysis are based mainly on the sample size of each study included in the analysis for our Fixed Effects Model whereas the calculation of the weights for the Random Effects Model also includes the variance of the dispersion between studies. Thus, the mean democracy-growth effect by encompassing all the aspects of democracy-growth studies that are represented with a standardized measure and weighted appropriately with a corresponding suitable indicator can be regarded as the *best* estimate of the entire empirical literature on the effect that democracy has on growth. The mean democracy-growth effect helps us answer two important questions: (a) whether democracy has a positive or negative effect on economic growth on the average, and (b) whether the democracy-growth effect is small or large. For instance, the mean democracy-growth effect may be positive but too small to be of economic significance. Most researchers follow Cohen's (1988) guidelines and regard the mean effect to be small if its absolute value is less than 0.10, medium if it is 0.25, and large if it is greater than 0.4

It is also desirable to try to detect the presence of publication bias that might explain the existence of a large combined or mean effect size. We use a series of tests to detect any publication bias for robustness purposes. The plot by precision is the traditional form. We use the funnel plot of precision by Fisher's Z^{77} . Note that large studies appear toward the top of the graph, and tend to cluster near the mean effect size. Smaller studies appear toward the bottom of the graph, and (since there is more random variation in the small studies) are dispersed across a range of values. This pattern tends to resemble a funnel, which is the basis for the plot's name. In the absence of publication bias the studies will be distributed symmetrically about the combined effect size. By contrast, in the presence of bias, the bottom

of the plot would tend to show a higher concentration of studies on one side of the mean than the other. This would reflect the fact that smaller studies (which appear toward the bottom) are more likely to be published if they have larger than average effects, which makes them more likely to meet the criterion for statistical significance.

Another test we use to determine if there is any publication bias is Duval and Tweedie's Trim and Fill (2000). Trim and Fill builds on the key idea behind the funnel plot; that in the absence of bias the plot would be symmetric about the summary effect. If there are more small studies on the right than on the left, the concern is that studies may be missing from the left. The Trim and Fill procedure imputes these missing studies, adds them to the analysis, and then re-computes the summary effect size. The more the missing studies the more the publication bias.

Another way to try to detect the presence of publication bias is Begg and Mazumdar's rank correlation test, which reports the rank correlation (Kendall's tau) between the standardized effect size and the variances (or standard errors) of these effects. Tau would be interpreted much the same way as any correlation, with a value of zero indicating no relationship between effect size and precision, and deviations from zero indicating the presence of a relationship. If asymmetry is caused by publication bias we would expect to see high standard errors (small studies) associated with larger effect sizes. If larger effects are represented by low values, tau would be positive, while if larger effects are represented by high values, tau would be negative. Since asymmetry could appear in the reverse direction, the significance test is two-sided.

The next test we use to check for publication bias is Egger's linear regression method. Like the rank correlation test it quantifies the bias captured by the funnel plot. While Begg and Mazumdar's test uses ranks, Egger's method uses the actual values of the effect sizes and their precision.

In the Egger test, the standardized effect (effect size divided by standard error) is regressed on precision (inverse of standard error). Small studies generally have a precision close to zero, due to their high standard error. In the absence of bias we would expect to see such studies associated with small standardized effects. We would expect to see large studies associated with large standardized effects. This would create a regression line whose intercept approached the origin. If the intercept deviates from this expectation, publication bias may be the cause. This would occur, for instance, when small studies are disproportionately associated with larger effect sizes. As was true for the rank correlation test, the significance test should be two-tailed.

Finally, the last test used to detect any publication bias is Rosenthal's Fail-safe N test, which computes the number of missing studies (with mean effect of zero) that would need to be added to the analysis to yield a statistically insignificant overall effect. The greater the number of these studies the less publication bias we might have. If the number of these studies is very small then that is an indication that we might have a very large publication bias.

A fixed effects meta-analysis model is appropriate when there is a common democracy growth effect that all studies are estimating. In such a situation, the only reasons why study results will differ are (a) sampling error and (b) systematic differences due to the research process. In a random effects meta-analysis model, study differences result from both sampling error as well as *random* differences between studies. The random effects model is appropriate if a subsample of empirical studies is used in a meta-analysis (as opposed to the entire population) and if the source of differences between studies cannot be identified. In a mixed effects model there are both random differences as well as systematic differences between studies. In the results section of this article, several of the moderator variables are identified that capture *systematic* (nonrandom) differences between studies. It is shown there that a fixed effects model

captures adequately the distribution of the findings of the empirical democracy-growth literature and that the variation in reported results is not due to random differences between studies.

3.2 Methodology of MRA

In this paper we run 4 Fixed Effects models (regressions) and 4 Random Effects models (regressions) for both the ALL SET and BEST SET data samples.

In the FE Model 1 and the RE Model 1 we use the following set of covariates: Cross-section Pooled Data, Panel Data, NoYears, Single, Politics, Primary, Crossauthor, Prior, lgoog_pa, Year.

These models will tell us if the democracy-growth effect depends on certain data characteristics or on the accumulated knowledge that the researcher had at his disposal.

In the FE Model 2 and the RE Model 2 we use the following set of covariates: LA, Africa, Asia, Developed, 1970's, 1980's, 1990's, 2000's, 2010's, NoCountries.

These models will tell us if the democracy-growth effect depends on certain regional data characteristics or on certain chronological ones.

In the FE Model 3 and the RE Model 3 we use the following set of covariates: Gastil, Dem. Dummy, DemoSq, Region, Ecofreedom, Inequality, Instability, Population, HC, PC.

These models will tell us if the democracy-growth effect depends on certain measures used to capture the presence and the degree of democracy in the different studies or passes through certain socioeconomic channels.

In the FE Model 4 and the RE Model 4 we use the following set of covariates: Non-OLS, OLS, Endogenous, Inflation, Convergence, Openness, Govt. Size, lagdep, lags, and time.

These models will tell us if the democracy-growth effect depends on certain estimation characteristics, the use of certain dynamic measures or passes through certain macroeconomic channels.

All of the above models will also tell us if there is any unexplained variance of the true effects remaining.

4. Data Analysis

4.1 Data

We kept 75 out of the 84 primary studies that Doucouliagos and Ulubasoglu used in their meta-analysis and we added another 35. There were actually more than a total of 110 studies exploring democracy and growth. However, we decided to use only those studies whose results were comparable. The selection criteria are similar to those used by Doucouliagos and Ulubasoglu and are as follows. First, we included all of the primary studies used in Doucouliagos and Ulubasoglu's meta-analysis that we could find. Second, from the new studies added we included only those studies that had been published and excluded any working papers. Third, studies where the dependent variable was not economic growth but a *constructed* variable that might include economic growth or the level of economic activity instead were excluded. Fourth, studies that seemed to estimate the impact of democracy on growth but failed to report the necessary results were excluded as well. Fifth, only those studies that conducted some kind of econometric analysis were included. Thus, all of the primary studies included in the meta-analysis were chosen on the basis that they offered statistics from which standardized measures of the impact of democracy on growth could be calculated. In general the impact of our selection criteria is to exclude most of the earlier published literature (mostly published in the 1970s) and also exclude the newer unpublished literature. The earlier literature is not included as it is largely not comparable with the subsequent empirical and econometric-based literature. The newer literature is excluded because

working papers may not contain the final set of estimates and have not yet been through the quality filters of the publication process. It should be noted that our dataset, like Doucouliagos and Ulubasoglu's, includes some single-country studies. These were included in order to have a comprehensive dataset. Excluding the single-country studies does not change any of our results.

Two different datasets were derived from the set of 110 comparable studies. The first is the ALL SET, which includes the democracy-growth estimates of 1221 regressions regarded as separate studies. This is the entire pool of publicly available estimates on the democracy-growth relationship. Second, we derived 110 estimates, one from each study, being the best estimate provided by each study (the BEST SET). In most cases, authors state their preferred estimate as the benchmark estimate, but for some studies we have had to make some judgment. In general, estimates that involve larger groups of countries have been included.

4.2 Moderator Variables

Table 2 lists all the moderator variables used in the MRA, together with informative descriptions. It should be noted that all these variables have been chosen as they are all potentially important. That is, we have avoided data mining and have considered which factors are likely to be important in influencing reported results. An important source of variation in the results is the type and the composition of countries used in the primary studies. Accordingly, it is important to identify which countries are employed for the analysis in the primary studies. Data preclude the investigation of country-specific democracy-growth effects, as most of the studies do not provide enough detail to identify all the individual countries. It is possible, however, to identify four broad regional groupings: *Africa*, *Asia*, *Latin America*, and *Developed* countries (mainly the OECD). We use these dummies to derive region-

specific democracy-growth effects (keeping research design differences constant)⁷⁸. Also the continuous variable *NoCountries* is included to identify the number of countries included in a study. A similar approach to the regional dummies can be adopted to investigate time-period effects. In particular, five time (decade) dummy variables are constructed: *1970's*, *1980's*, *1990's*, *2000's*, and *2010's* covering the periods of data used in the primary studies. By including these dummies it is then possible to identify decade-specific effects in the democracy-growth association and explore whether the association is time varying. We also include the continuous variable *NoYears* to identify the number of years covered by the data of the original studies.

The use of different measures of democracy could also be an important source of variation in empirical results (Bollen 1990; Sirowy and Inkeles 1990). Thus, we use the *Gastil* variable to check whether studies that use this index tend to find different results, as compared to those that use other indices (which are mainly Polity measures in our dataset). In addition, while some authors have argued that democracy is a continuous concept (e.g., Bollen 1990), others such as Przeworski et al. (1996) and Przeworski and Limongi (1997) prefer to represent it with a dichotomous indicator. The *Dem. Dummy* variable checks whether dichotomization of the democracy measure impacts on the reported partial correlations. The indirect effects of democracy on growth are critically important. Such channels are generally addressed in an augmented-neoclassical growth model format by adding the channel variables into the right-hand side of the regressions and observing their magnitude and their significance, as well as that of the democracy variable (see Dawson 1998 for an exposition). In our context, these indirect effects can be explored through the variables *Human Capital (HC)*, *Physical Capital (PC)*, *Ecofreedom*, *Inequality*, *Instability*, *Govt. Size*, *Openness*, and *Inflation*.

Other differences in specification can be investigated through the variable democracy squared (*DemoSq*), regional dummies (*Region*)⁷⁹, and an initial income variable (*Convergence*). Knowledge differences between authors are captured by two variables. The variable *Prior* represents whether the author had published previously in this area. This variable captures individual author-specific knowledge effects in modelling the democracy-growth process. Second, the variable *Crossauthor* captures whether the author had received comments/feedback from others publishing in this area⁸⁰. We have no interest in the sign on any of these variables. We merely test whether these knowledge effects impact on reported coefficients.

Publication characteristics are captured by three variables. The *Politics* variable is included to test whether journals of different disciplines tend to publish different results (economics is the base). The continuous variable *lgoog_pa* shows the trust toward the author of the published study by his peers, as measured by the logarithm of the number of citations per year from Google Scholar. The continuous variable *Year* shows the year of publication of the primary study, which can help us sort our results by year of publication to come to interesting conclusions about the effect size dispersion.

There are three measures of dynamics. The variable *lagdep* is included to show if a lag of the dependent variable, in our case growth, is used in the analysis of the primary studies. The variable *lags* is included to show if lags of some of the control variables are used in the analysis of the original studies. The variable *time* is included if time dynamics is controlled for by the use of time dummies in the primary analyses.

Primary represents whether a study's primary focus is the democracy-growth relationship, as opposed to the inclusion of democracy merely as a control variable.

Table 2 Covariates used in the MRA of Democracy-Growth Effects

Moderator Variable	Description
<i>Data Differences</i>	
Cross-section Pooled Data	BV ⁸¹ : 1=cross-sectional pooled data used
Panel Data	BV: 1=panel data used
Single	BV: 1=time series for single country used
NoYears	Number of years
NoCountries	Number of countries
LA	BV: 1=Latin American countries included in sample
Africa	BV: 1=African countries included in sample
Asia	BV: 1=Asian countries included in sample
Developed	BV: 1=Developed countries included in sample
1970's	BV: 1=data from 1970's used
1980's	BV: 1=data from 1980's used
1990's	BV: 1=data from 1990's used
2000's	BV: 1=data from 2000's used
2010's	BV: 1=data from 2010's used
Gastil	BV: 1=used Gastil indicator
Dem. Dummy	BV: 1=used a dummy variable for democracy rather than a democracy index
<i>Knowledge Effects</i>	
Prior	BV: 1=author has published previously in this area
Crossauthor	BV: 1=author states receiving feedback from others that have also published in this area before him

Table 2 continued Covariates used in the MRA of Democracy-Growth Effects

Moderator Variable	Description
<i>Specification Differences</i>	
DemoSq	BV: 1=non-linear terms of democracy added
Region	BV: 1=regional dummies used
Ecofreedom	BV: 1=economic freedom variable included
Inequality	BV: 1=inequality variable included
Instability	BV: 1=political instability variable included
Inflation	BV: 1=inflation variable included
Population	BV: 1=population variable included
HC	BV: 1=human capital variable included
PC	BV: 1=physical capital variable included
Openness	BV: 1=foreign trade variable included
Govt. Size	BV: 1=government size variable included
Convergence	BV: 1=initial income variable included
<i>Estimation Differences</i>	
Non-OLS	BV: 1=did not use OLS
OLS	BV: 1=did use OLS
Endogenous	BV: 1=democracy is endogenous
<i>Publication Effects</i>	
Politics	BV: 1=if published in a political science journal
lgoog_pa	The logarithm of the number of citations per year from Google Scholar
Year	The year of publication of the study

Table 2 continued Covariates used in the MRA of Democracy-Growth Effects

Moderator Variable	Description
<i>Measure of Dynamics</i>	
lagdep	BV: 1=if lagged dependent variable is used in the regression
lags	BV: 1=if lagged control variables are used in the regression
time	BV: 1=if time dynamics is controlled for
<i>Other</i>	
Primary	BV: 1=if democracy is the primary issue of interest

5. Results

5.1 ALL SET

In this section we are going to present the results from the analysis of the ALL SET; both the meta-analysis results and the MRA results.

5.1.1. Meta-analysis Results

Table 3

Model		Effect size and 95% confidence interval			Test of null [2-Tail]		Heterogeneity Test			
Model	Number studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df(Q)	P-value	I-squared
Fixed	1221	-0.009	-0.011	-0.007	-10.076	0.000	152683.053	1220	0.000	99.201
Random	1221	-0.014	-0.034	0.006	-1.377	0.168				

As we can see from the above table the fixed effects model overall summary result of -0.009 has a Z-value of -10.076 and a p-value of 0.000; thus, we can safely reject the null hypothesis that the effect size, which is the correlation in our case, is 0.0 (or equivalently that there is no effect of democracy on growth). Assuming that the 1221 studies are valid we can conclude that democracy probably does affect growth even minimally and according to the sign of the point estimate this effect is negative. However, according to Cohen's guidelines an absolute value of less than 0.10 indicates a small effect size and since the absolute value of the combined effect size here is 0.01 we can safely say that the magnitude of our effect is practically zero and so democracy does not affect growth one way or the other.

On the other hand, the random effects model overall summary result of -0.014 has a Z-value of -1.377 and a p-value of 0.168; thus, we cannot reject the null hypothesis that the effect size, which is the correlation in our case, is 0.0 (or equivalently that there is no effect of democracy on growth). Assuming that the 1221 studies are valid we can safely conclude that democracy probably does not affect growth even by a little.

Looking at the heterogeneity test the Q statistic, which refers to both the fixed and random effects models, has a value of 152683.053 with 1220 degrees of freedom and a p-value of 0.000, which means that we must reject the null hypothesis of homogeneity and come to the conclusion that there is heterogeneity in the dispersion of the effects among our studies and so the dispersion is not due only to differences in the sample size of each study but also to some real differences in the true effect size of each study. This also means that we must reject the fixed effects model as a valid statistical model in our case and keep the conclusions that are derived from the random effects model. However, due to the construction of our ALL SET sample, which includes all 1221 regression estimates of the individual effect sizes from all the models used in all the studies, we can accept the fixed effects model as the

appropriate model to use here since the majority of the “constructed” studies⁸² measure the exact same relationship between democracy and growth in the exact same way and thus also keep the conclusions derived from the fixed effects model. In our case, we are lucky to come basically to the same conclusion that there is a zero combined effect of democracy on growth regardless of the statistical model we use.

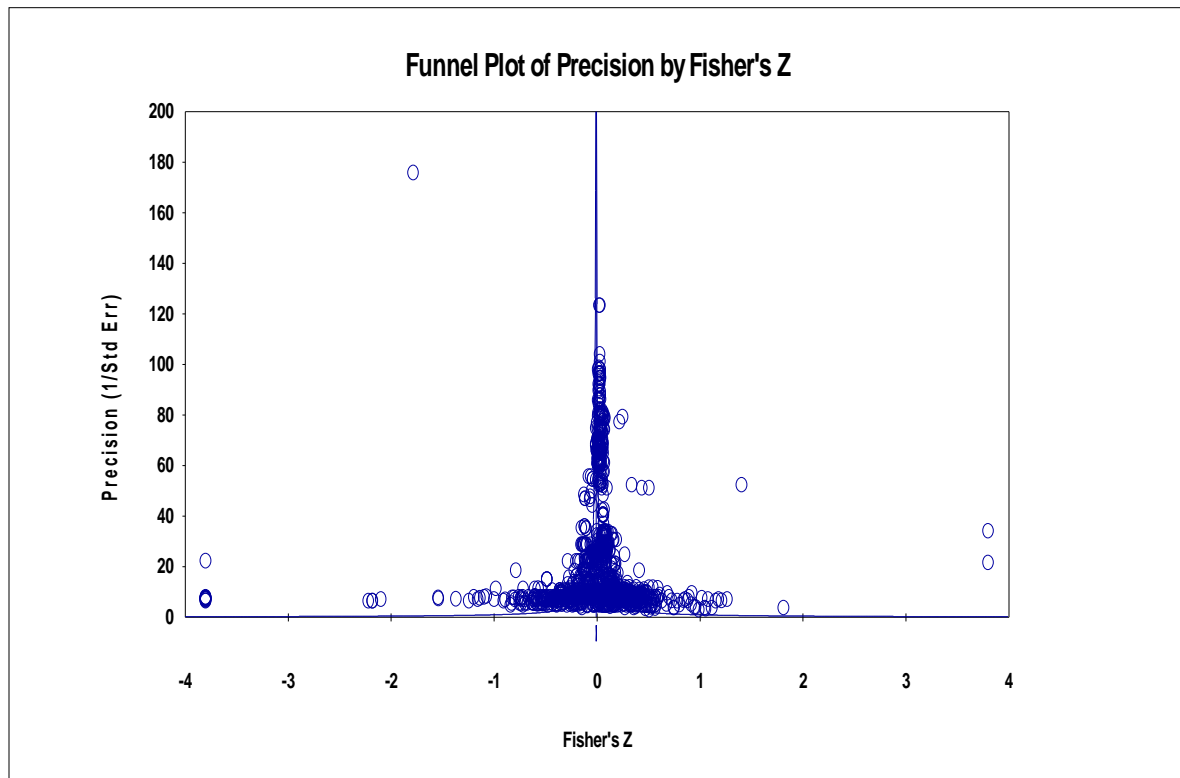
Finally, looking at the I^2 value which is a proportion referring only to the random effects model we conclude that if we were able to remove all the sampling error from our studies the dispersion pattern, which is the variance of the dispersion, would be 99% the same, which verifies the conclusion we derived from our Q-test that there are indeed real differences of the true effects among our studies.

We are not able to present the forest plot here due to the enormous size of the number of our studies but were you to see the screen of the CMA software where the forest plot was calculated and also see it sorted by sample size you would immediately realize that the effect size is minor near zero toward the top of the forest plot where the studies with the largest samples cluster and larger as extreme as -0.912 for studies toward the bottom of the forest plot where the studies with the smallest samples cluster. This shows us that the effect that democracy has on growth even if it is significant is very small, close to zero, for studies with large samples that would avoid sampling error.

When we sort our forest plot by earliest year of publication of our studies we immediately realize that the effect size is greater toward the top of the forest plot where the earliest publicized studies cluster and smaller as minor as 0.008 for studies toward the bottom of the forest plot where the latest publicized studies cluster. This shows us that the effect that democracy has on growth even if it is significant is very small, close to zero, for the latest studies especially of the last decade, which usually have the largest samples, compared to some of the earliest studies back in the 80's, which seem to have overestimated the effect of democracy on growth mainly because they were based on smaller samples.

Publication Bias⁸³

If we check for publication bias by the use of the funnel plot of precision by Fisher's Z as is shown below we are going to realize that there is no publication bias since as is obvious from the graph almost all of the studies fall symmetrically about the central axis without any pronounced asymmetry to the right or to the left that would otherwise indicate the presence of publication bias. This is probably due to the fact that we use the 1221 regression estimates as a pool of independent studies when in fact a lot of them are just different models within the same study so they share similar samples and specification characteristics.



Classic fail-safe N**Classic fail-safe N**

Z-value for observed studies	6.07869
P-value for observed studies	0.00000
Alpha	0.05000
Tails	2.00000
Z for alpha	1.95996
Number of observed studies	1221.00000
Number of missing studies that would bring p-value to > alpha	0524.00000

This meta-analysis incorporates data from 1221 studies, which yield a z-value of 6.07869 and a corresponding 2-tailed p-value of 0.00000.

The fail-safe N is 10524. This means that we would need to locate and include 10524 'null' studies in order for the combined 2-tailed p-value to exceed 0.050.

Put another way, we would have to have 8.6 missing studies for every observed study for the effect to be nullified.

Thus, we can safely say that there is no discernible publication bias.

Begg and Mazumdar Rank Correlation Test**Begg and Mazumdar rank correlation**

Kendall's S statistic (P-Q) 16384.00000

Kendall's tau without continuity correction

Tau	-0.20997
z-value for tau	1.#INF
P-value (1-tailed)	0.00000
P-value (2-tailed)	0.00000

Kendall's tau with continuity correction

Tau	-0.20997
z-value for tau	1.#INF
P-value (1-tailed)	0.00000
P-value (2-tailed)	0.00000

In this case Kendall's tau b (corrected for ties, if any) is -0.20997, with a 1-tailed p-value (recommended) of 0.00000 or a 2-tailed p-value of 0.00000 (based on continuity-corrected normal approximation), which means that it is significant and since its value is relatively medium we can safely say that there is a noticeable publication bias due to high standard errors of small studies with larger effect sizes with high values.

Egger's Test of the Intercept

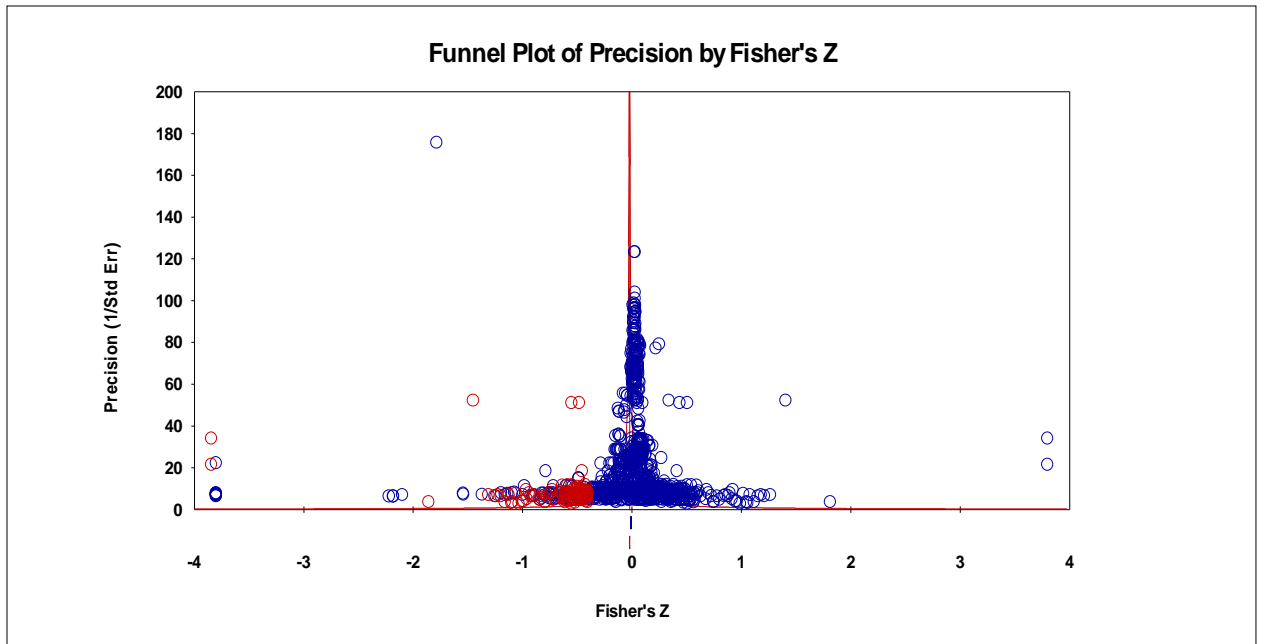
Egger's regression intercept

Intercept	0.68472
Standard error	0.43551
95% lower limit (2-tailed)	-0.16971
95% upper limit (2-tailed)	1.53915
t-value	1.57222
df	1219.00000
P-value (1-tailed)	0.05808
P-value (2-tailed)	0.11616

In this case the intercept (B0) is 0.68472, 95% confidence interval (-0.16971, 1.53915), with $t=1.57222$, $df=1219$. The 1-tailed p-value (recommended) is 0.05808, and the 2-tailed p-value is 0.11616 which means that Egger's regression intercept in this case is not significant and thus we cannot say if there is any publication bias.

Duval and Tweedie's Trim and Fill

The algorithm is looking for missing studies based on a fixed effect model, and is looking for missing studies only to the left side of the mean effect (these parameters are set by the user). Using these parameters the method suggests that 129 studies are missing which is a small number compared to the observed number of studies as we can see below in the Funnel Plot.



Under the fixed effect model the point estimate and 95% confidence interval for the combined studies is -0.00887 (-0.01059, -0.00714). Using Trim and Fill the imputed point estimate is -0.02152 (-0.02324, -0.01981).

Under the random effects model the point estimate and 95% confidence interval for the combined studies is -0.01417 (-0.03433, 0.00600). Using Trim and Fill the imputed point estimate is -0.07161 (-0.09243, -0.05073).

Again we can safely conclude based on the above results that there is very little publication bias.

5.1.2. MRA Results

Model 1

In Model 1 we include 10 covariates that have to do mainly with the data differences of the primary studies, the knowledge effects seeping through the studies and some other covariates such as Politics and Primary that have to do with the publication and the main aims of each study.

Fixed Effects Model

Main results for Model 1, Fixed effect, Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	20.9954	0.6418	19.7375	22.2533	32.71	0.0000
Cross-section pooled data: 1	0.0387	0.0719	-0.1023	0.1797	0.54	0.5904
Panel Data: 1	0.0774	0.0719	-0.0635	0.2184	1.08	0.2816
NoYears	0.0012	0.0000	0.0012	0.0013	43.88	0.0000
Single: 1	-0.2917	0.0759	-0.4405	-0.1429	-3.84	0.0001
Politics: 1	0.0633	0.0025	0.0584	0.0682	25.18	0.0000
Primary: 1	-0.1365	0.0032	-0.1428	-0.1301	-42.13	0.0000
Crossauthor: 1	0.3616	0.0031	0.3555	0.3677	116.47	0.0000
Prior: 1	0.3599	0.0033	0.3535	0.3664	108.80	0.0000
Igoog_pa	-0.3365	0.0024	-0.3413	-0.3318	-138.26	0.0000
Year	-0.0103	0.0003	-0.0110	-0.0097	-32.49	0.0000

Analysis of variance

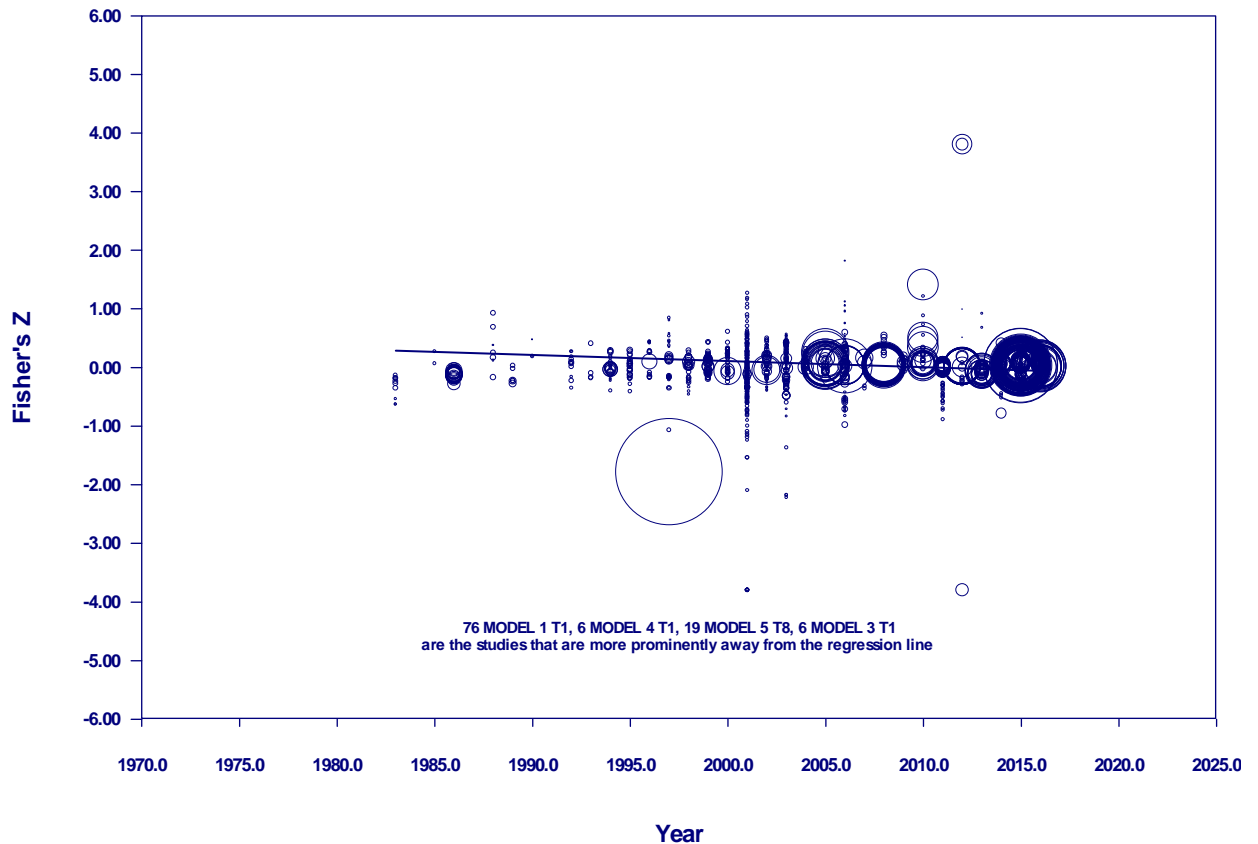
	Q	df	p
Model	48732.4238	10.0000	0.0000
Residual	103950.6294	1210.0000	0.0000
Total	152683.0532	1220.0000	0.0000

Number of studies in the analysis 1221

As we can observe from the above table all the covariates except two, cross-section pooled data and panel data, are significant for the effect size. From those that are significant two, single and lgoog_pa, have a pronounced negative effect compared to the rest whereas another pair, crossauthor and prior, have a pronounced positive effect compared to the rest.

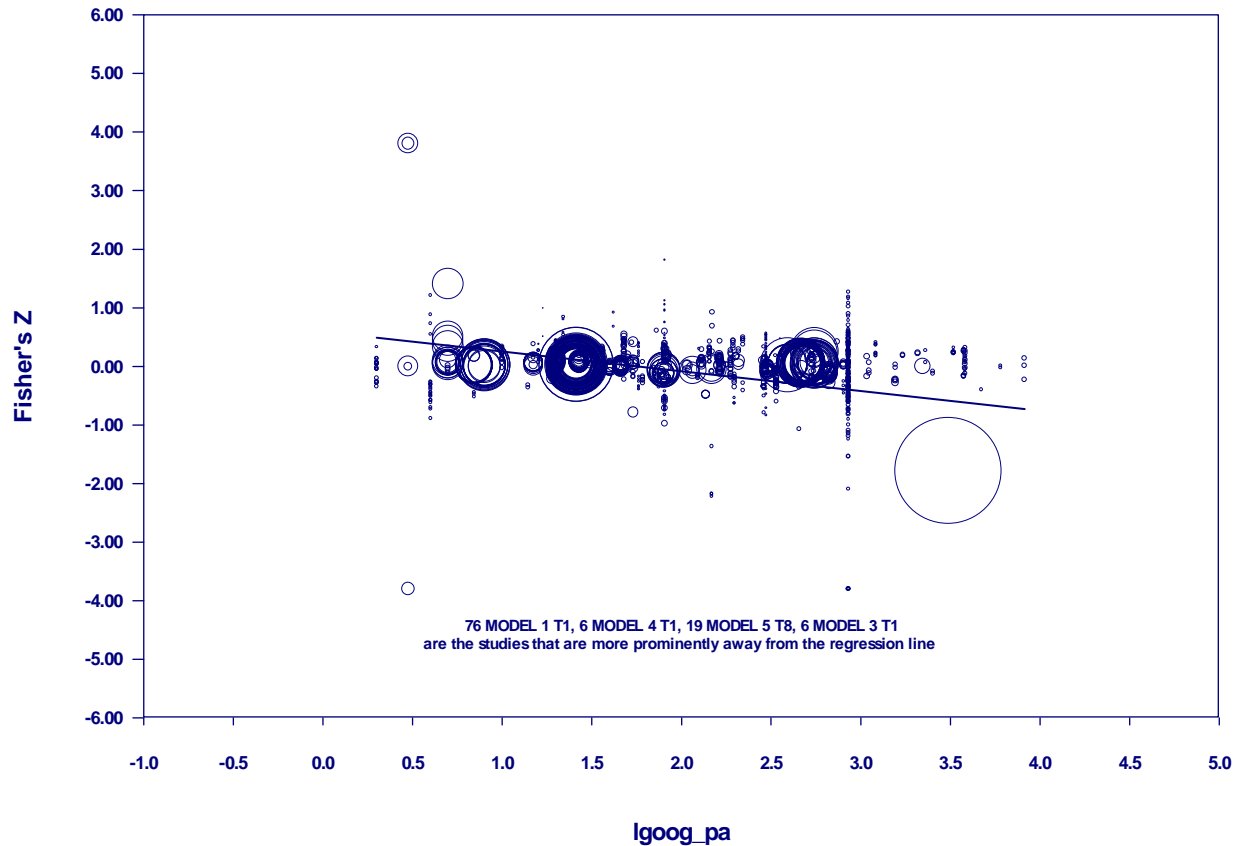
Below we are going to present two graphs that show us the regression of Fisher's Z on two of our covariates so that we can also see graphically how wide is the dispersion of the effects of individual primary studies around the regression line which represents the mean effect of our whole sample of primary studies and also get a better sense of the direction of the effect size as a function of covariates. The two covariates chosen in this case were Year and lgoog_pa because we wanted to see the direction of the effect size as a function of year of publication and as a function of the log citation score that they received based on the number of their Google Scholar citations.

Regression of Fisher's Z on Year



In our sample of studies the mean effect size for a study at any given year is indicated by the regression line. As we can see from the above scatterplot the majority of the primary studies fall on the regression line or close to it which means that most of them have effect sizes close to the mean except for four studies that are far away from the mean with extreme Fisher's Z scores that indicate very high correlations close to -1 and +1 respectively. Also most of the big studies that are close to the mean effect size are toward the right of the regression line indicating the fact that the majority of studies with large samples have been done in recent years.

Regression of Fisher's Z on lgoog_pa



In our sample of studies the mean effect size for a study at any given log citation score is indicated by the regression line. As we can see from the above scatterplot a great number of the primary studies fall on the regression line or close to it which means that a lot of them have effect sizes close to the mean except for four studies that are far away from the mean with extreme Fisher's Z scores that indicate very high correlations close to -1 and +1 respectively and they happen to be the same studies that we have encountered in the previous scatterplot. Also most of the big studies that are close to the mean effect size are toward the left of the regression line indicating the fact that most of our primary studies have low log citation scores because they have a relatively small number of citations.

Random Effects Model

Main results for Model 1, Random effects (MM), Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	2.1059	3.1926	-4.1516	8.3633	0.66	0.5095
Cross-section pooled data: 1	-0.0346	0.2179	-0.4618	0.3925	-0.16	0.8737
Panel Data: 1	-0.0246	0.2167	-0.4493	0.4002	-0.11	0.9098
NoYears	0.0003	0.0002	-0.0001	0.0007	1.39	0.1655
Single: 1	-0.3501	0.2235	-0.7881	0.0879	-1.57	0.1172
Politics: 1	0.0438	0.0191	0.0063	0.0813	2.29	0.0222
Primary: 1	-0.0211	0.0207	-0.0617	0.0196	-1.02	0.3100
Crossauthor: 1	0.0100	0.0255	-0.0399	0.0599	0.39	0.6935
Prior: 1	0.1263	0.0274	0.0726	0.1800	4.61	0.0000
lgoog_pa	-0.1044	0.0159	-0.1356	-0.0731	-6.54	0.0000
Year	-0.0010	0.0016	-0.0041	0.0022	-0.60	0.5485

Statistics for Model 1

Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero

$Q = 133.35$, $df = 10$, $p = 0.0000$

Goodness of fit: Test that unexplained variance is zero

$\tau^2 = 0.0825$, $\tau = 0.2873$, $I^2 = 98.84\%$, $Q = 103950.63$, $df = 1210$, $p = 0.0000$

Comparison of Model 1 with the null model

Total between-study variance (intercept only)

$\tau^2 = 0.1178$, $\tau = 0.3432$, $I^2 = 99.20\%$, $Q = 152683.05$, $df = 1220$, $p = 0.0000$

Proportion of total between-study variance explained by Model 1

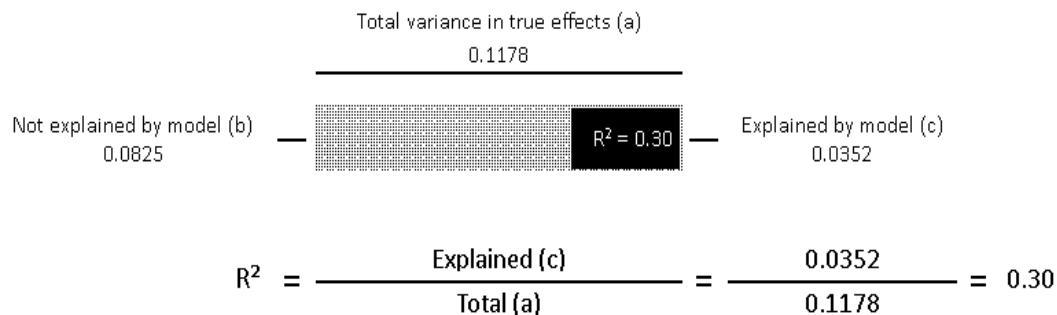
R^2 analog = 0.30

Number of studies in the analysis 1221

As we can observe from the above table all the covariates except three, politics, prior and lgoog_pa, are not significant for the effect size. From the only three that are significant lgoog_pa has a small but noticeable negative effect, prior has a small but noticeable positive effect, and politics has almost a zero effect. The test of the model tells us that the effect size does differ by subgroup membership⁸⁴ that is for example if a study was conducted using panel data or not is important and so on for the rest of the covariates. The Goodness of fit test tells us that the unexplained variance of the true

effects is not zero and so the true effect size varies from study to study, even within subgroups. Put another way, the model is incomplete – knowing whether a study falls into the Primary or not Primary subgroup for example does not allow us to completely predict its effect size and the same goes for the rest of the covariates. The I^2 statistic is 98.84% which means that nearly all of the observed variance that remains (that is, within subgroups) reflects real differences in study effects.

R^2 for Model 1, Random effects (MM), Z-Distribution, Fisher's Z



(a) To compute the total variance (of all studies about the grand mean) we run the regression with no covariates.

(b) To compute the variance not explained by the model (of all studies about the regression line) we run the regression with the covariates.

(c) The difference between these values gives us the variance explained by the model.

As we can see from the above graph $R^2=0.30$, which means that only 30% of the variance in true effects can be explained by the covariates of model 1. This means that there is a 70% of unexplained variance by Model 1 and its covariates, which is why we are going to perform the same MRA for another model with another set of covariates that might explain these differences in the true effect sizes among the different studies.

Model 2

In Model 2 we include 10 covariates that have to do mainly with the data differences of the primary studies pertaining to the time period of data retrieval and the country composition in the sample of each study.

Fixed Effects Model

Main results for Model 2, Fixed effect, Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.1098	0.0085	0.0932	0.1263	12.99	0.0000
LA: 1	0.0231	0.0077	0.0080	0.0383	3.00	0.0027
Africa: 1	-0.0252	0.0060	-0.0370	-0.0135	-4.21	0.0000
Asia: 1	-0.0265	0.0068	-0.0398	-0.0132	-3.91	0.0001
Developed: 1	-0.0359	0.0038	-0.0434	-0.0285	-9.44	0.0000
1970's: 1	-0.2050	0.0038	-0.2125	-0.1975	-53.53	0.0000
1980's: 1	0.0445	0.0079	0.0289	0.0601	5.60	0.0000
1990's: 1	-0.1051	0.0056	-0.1161	-0.0941	-18.75	0.0000
2000's: 1	0.1549	0.0021	0.1509	0.1590	74.77	0.0000
2010's: 1	-0.1661	0.0095	-0.1847	-0.1474	-17.47	0.0000
NoCountries	0.0006	0.0000	0.0006	0.0007	27.62	0.0000

Analysis of variance

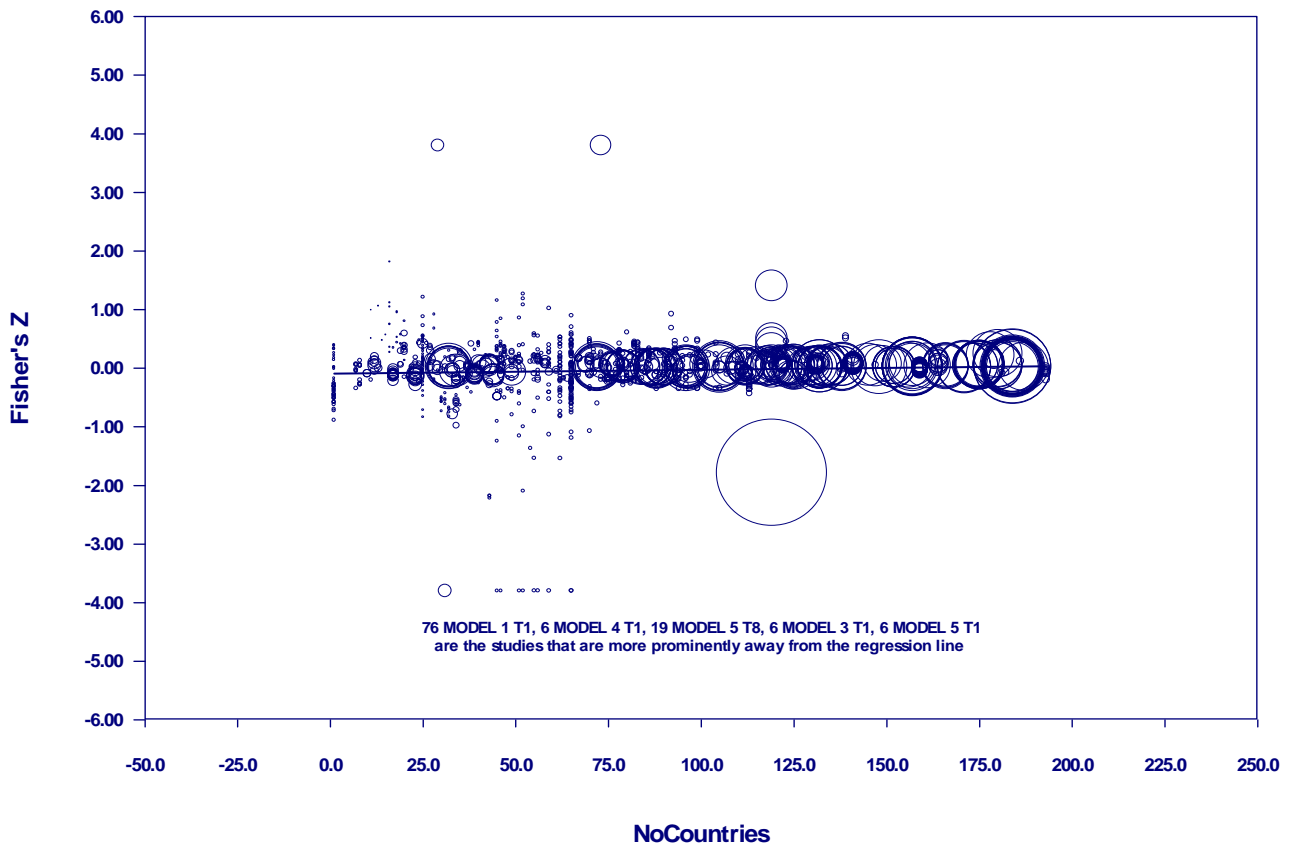
	Q	df	p
Model	10799.3776	10.0000	0.0000
Residual	141883.6756	1210.0000	0.0000
Total	152683.0532	1220.0000	0.0000

Number of studies in the analysis 1221

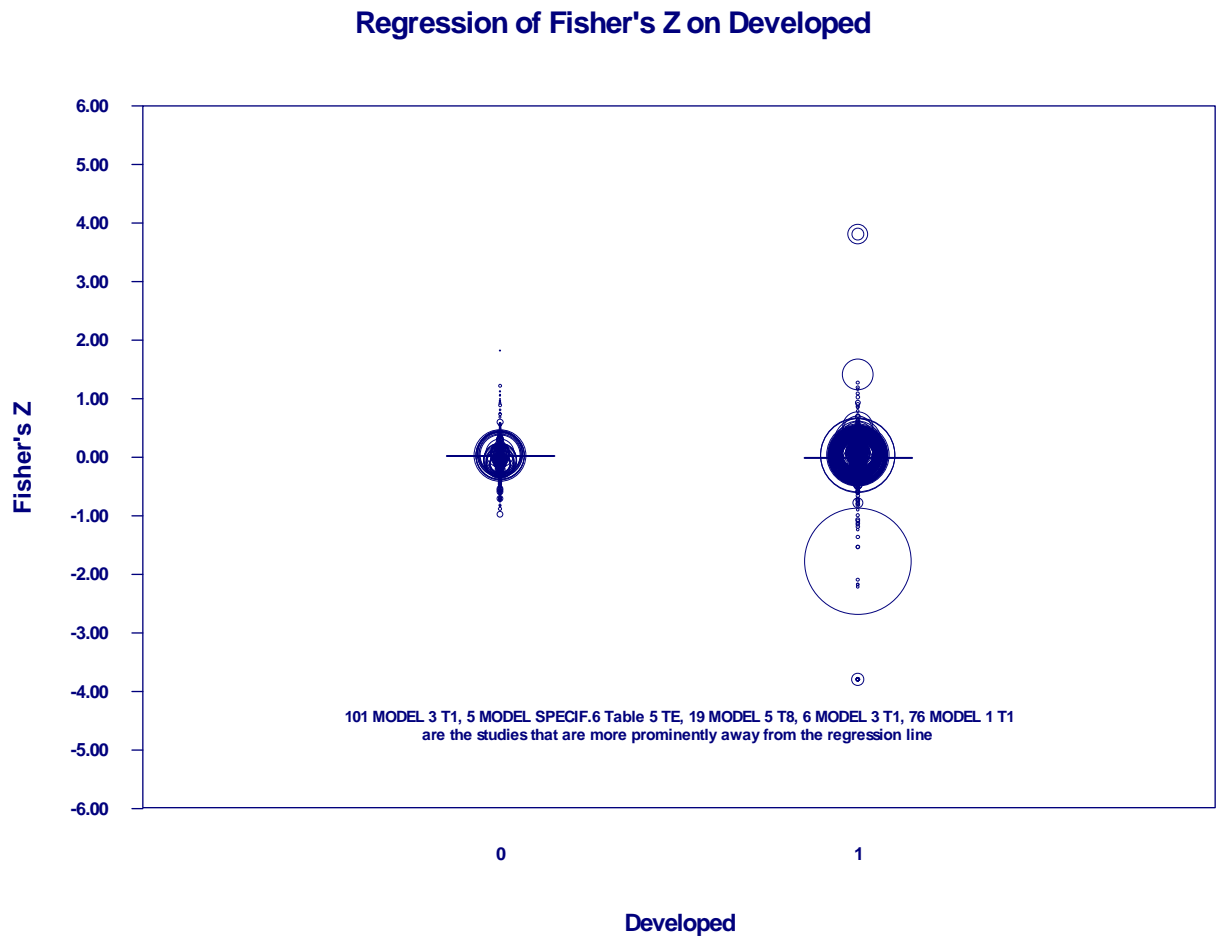
As we can observe from the above table all the covariates are significant for the effect size. From all the covariates that are significant two, 1970's and 2010's, have a noticeable negative effect compared to the rest whereas only one, 2000's, has a noticeable positive effect compared to the rest.

Below we are going to present two graphs that show us the regression of Fisher's Z on two of our covariates so that we can also see graphically how wide is the dispersion of the effects of individual primary studies around the regression line, which represents the mean effect of our whole sample of primary studies and also get a better sense of the direction of the effect size as a function of covariates. The two covariates chosen in this case were NoCountries and Developed because we wanted to see the direction of the effect size as a function of the number of countries included in the primary studies and as a function of the subgroup of studies including developed countries.

Regression of Fisher's Z on NoCountries



In our sample of studies the mean effect size for a study at any given NoCountry is indicated by the regression line. As we can see from the above scatterplot the majority of the primary studies fall on the regression line or close to it, which means that most of them have effect sizes close to the mean except for five studies that are far away from the mean with extreme Fisher's Z scores that indicate very high correlations close to -1 and +1 respectively. Also most of the big studies that are close to the mean effect size are toward the right of the middle of the regression line indicating the fact that the majority of studies with a large number of countries, 75 and above to be exact, exhibit similar effect sizes compared to the rest.



In our sample of studies the mean effect size for a study that included developed countries is shown by the regression line which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot the majority of the primary studies including developed countries fall on the regression line or close to it which means that a lot of them have effect sizes close to the mean except for five studies that are far away from the mean with extreme Fisher's Z scores that indicate very high correlations close to -1 and +1 respectively and they happen to be for the most part the same studies that we have encountered in the previous scatterplot.

Random Effects Model

Main results for Model 2, Random effects (MM), Z-Distribution, Fisher

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	-0.0029	0.0416	-0.0844	0.0787	-0.07	0.9448
LA: 1	-0.0525	0.0546	-0.1596	0.0546	-0.96	0.3368
Africa: 1	0.2950	0.0436	0.2095	0.3805	6.76	0.0000
Asia: 1	-0.1768	0.0477	-0.2704	-0.0833	-3.70	0.0002
Developed: 1	-0.0261	0.0380	-0.1007	0.0485	-0.69	0.4926
1970's: 1	-0.1320	0.0345	-0.1996	-0.0645	-3.83	0.0001
1980's: 1	-0.0226	0.0402	-0.1015	0.0562	-0.56	0.5738
1990's: 1	0.0908	0.0273	0.0372	0.1443	3.32	0.0009
2000's: 1	0.0082	0.0285	-0.0476	0.0640	0.29	0.7727
2010's: 1	-0.1895	0.0642	-0.3153	-0.0638	-2.95	0.0031
NoCountries	0.0004	0.0003	-0.0002	0.0010	1.31	0.1908

Statistics for Model 2

Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero

Q = 126.80, df = 10, p = 0.0000

Goodness of fit: Test that unexplained variance is zero

Tau² = 0.1120, Tau = 0.3346, I² = 99.15%, Q = 141883.68, df = 1210, p = 0.0000

Comparison of Model 2 with the null model

Total between-study variance (intercept only)

Tau² = 0.1178, Tau = 0.3432, I² = 99.20%, Q = 152683.05, df = 1220, p = 0.0000

Proportion of total between-study variance explained by Model 2

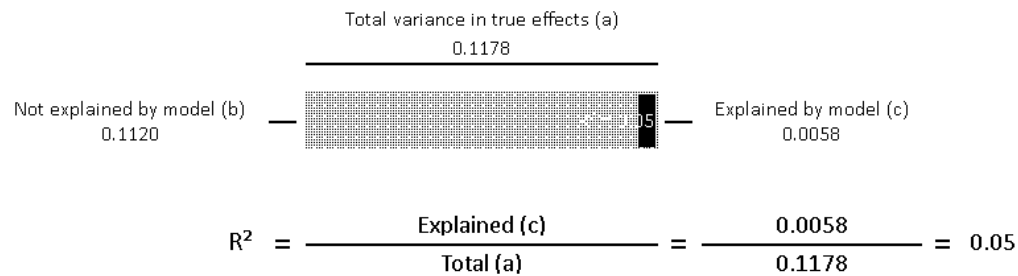
R² analog = 0.05

Number of studies in the analysis 1221

As we can observe from the above table five out of the ten covariates are significant for the effect size. From all the covariates that are significant one, 2010's, has a noticeable negative effect compared to the rest and another one, Africa, has a pronounced positive effect compared to the rest. The test of the model tells us that the effect size does differ by subgroup membership that is for example if a study included countries from Africa or not is important and so on for the rest of the covariates. The Goodness of fit test tells us that the unexplained variance of the true effects is not zero and so the true effect size varies from study to study, even within subgroups. Put another way, the model is incomplete – knowing

whether a study includes data from the 2010's or not for example does not allow us to completely predict its effect size and the same goes for the rest of the covariates. The I^2 statistic is 99.15% which means that nearly all of the observed variance that remains (that is, within subgroups) reflects real differences in study effects.

R^2 for Model 2, Random effects (MM), Z-Distribution, Fisher's Z



(a) To compute the total variance (of all studies about the grand mean) we run the regression with no covariates.

(b) To compute the variance not explained by the model (of all studies about the regression line) we run the regression with the covariates.

(c) The difference between these values gives us the variance explained by the model.

As we can see from the above graph $R^2=0.05$, which means that only 5% of the variance in true effects can be explained by the covariates of model 2. This means that there is a 95% of unexplained variance by Model 2 and its covariates, which is why we are going to perform the same MRA for another model with another set of covariates that might explain these differences in the true effect sizes among the different studies.

Model 3

In Model 3 we include 10 covariates that have to do mainly with the data differences and the specification differences of the primary studies pertaining to measure of democracy and also a number of covariates dealing with socioeconomic measures.

Fixed Effects Model

Main results for Model 3, Fixed effect, Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.0117	0.0021	0.0076	0.0158	5.59	0.0000
Gastil: 1	-0.3795	0.0031	-0.3856	-0.3735	-123.13	0.0000
Dem.Dummy: 1	0.0455	0.0025	0.0406	0.0505	18.05	0.0000
DemoSq: 1	0.3380	0.0074	0.3235	0.3526	45.56	0.0000
Region: 1	-0.1389	0.0019	-0.1426	-0.1352	-73.57	0.0000
Ecofreedom: 1	0.0539	0.0108	0.0327	0.0751	4.98	0.0000
Inequality: 1	-0.1918	0.0167	-0.2245	-0.1591	-11.50	0.0000
Instability: 1	-0.1183	0.0089	-0.1357	-0.1009	-13.33	0.0000
Population: 1	0.0917	0.0022	0.0874	0.0961	41.43	0.0000
HC: 1	-0.0080	0.0034	-0.0146	-0.0013	-2.34	0.0191
PC: 1	0.0513	0.0031	0.0453	0.0573	16.73	0.0000

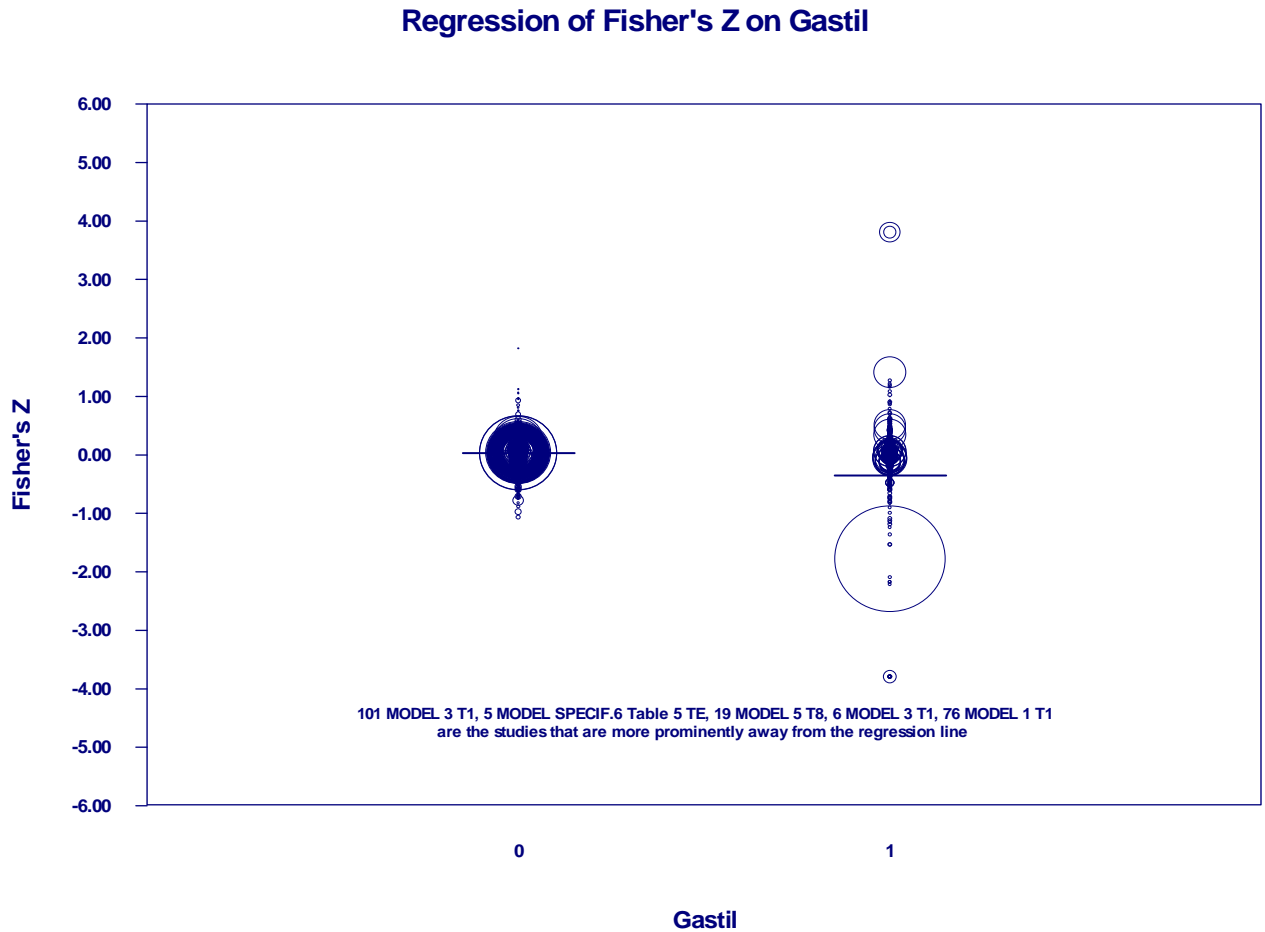
Analysis of variance

	Q	df	p
Model	27705.8947	10.0000	0.0000
Residual	124977.1585	1210.0000	0.0000
Total	152683.0532	1220.0000	0.0000

Number of studies in the analysis 1221

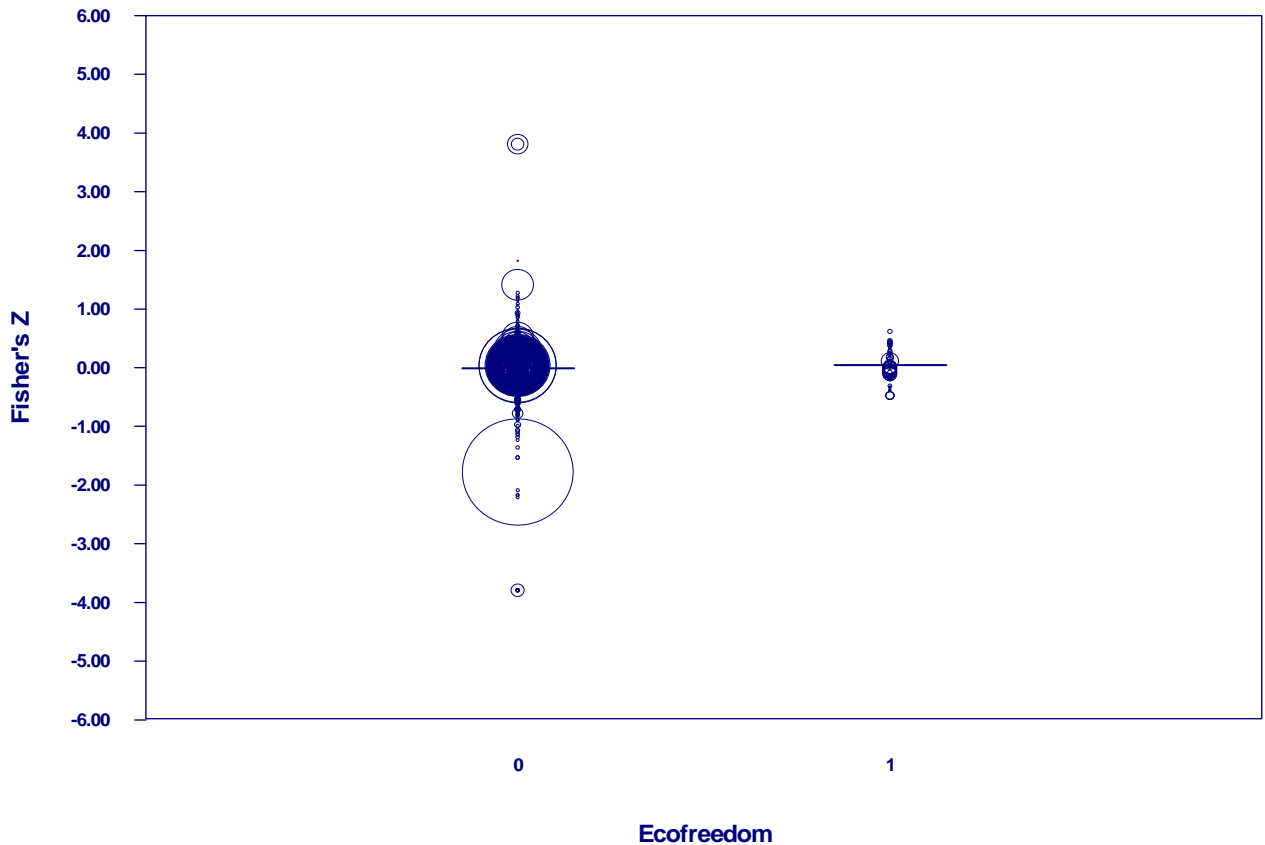
As we can observe from the above table all the covariates are significant for the effect size. From all the covariates that are significant one, Gastil, has a strong negative effect compared to the rest and another one, DemoSq, has an almost strong positive effect compared to the rest.

Below we are going to present two graphs that show us the regression of Fisher's Z on two of our covariates as we have done previously. The two covariates chosen in this case were Gastil and Ecofreedom because we wanted to see the direction of the effect size as a function of the subgroup of studies including the Gastil Index as a democracy measure and as a function of the subgroup of studies including an economic freedom measure.



In our sample of studies the mean effect size for a study that included the Gastil index as a democracy measure is shown by the regression line which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot a large number of the primary studies including the Gastil index fall either very close to the regression line or close to its neighborhood which means that a few of them have effect sizes close to the mean and the rest deviate from the mean from a little to a lot like the five studies that are far away from the mean with extreme Fisher's Z scores that indicate very high correlations close to -1 and +1 respectively and they happen to be for the most part the same studies that we have encountered in previous scatterplots.

Regression of Fisher's Z on Ecofreedom



In our sample of studies the mean effect size for a study that included a measure of economic freedom is shown by the regression line which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot almost all of the small primary studies including some kind of an economic freedom measure with no exception fall directly on the regression line or they are intersecting it which means that almost all of them have effect sizes very close to the mean if not exactly equal to it and their dispersion about the mean is minimal.

Random Effects Model

Main results for Model 3, Random effects (MM), Z-Distribution, Fish

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	-0.0107	0.0199	-0.0497	0.0283	-0.54	0.5912
Gastil: 1	0.0044	0.0217	-0.0382	0.0469	0.20	0.8412
Dem.Dummy: 1	0.0119	0.0308	-0.0485	0.0723	0.39	0.6992
DemoSq: 1	0.3100	0.0412	0.2293	0.3907	7.53	0.0000
Region: 1	-0.0020	0.0238	-0.0488	0.0447	-0.09	0.9321
Ecofreedom: 1	0.1214	0.0489	0.0254	0.2173	2.48	0.0132
Inequality: 1	-0.5591	0.0502	-0.6576	-0.4607	-11.13	0.0000
Instability: 1	-0.2189	0.0413	-0.2998	-0.1380	-5.30	0.0000
Population: 1	0.0108	0.0207	-0.0298	0.0515	0.52	0.6019
HC: 1	0.0376	0.0232	-0.0078	0.0830	1.62	0.1042
PC: 1	-0.0224	0.0238	-0.0691	0.0242	-0.94	0.3459

Statistics for Model 3

Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero

$Q = 291.61$, $df = 10$, $p = 0.0000$

Goodness of fit: Test that unexplained variance is zero

$\tau^2 = 0.0988$, $\tau = 0.3143$, $I^2 = 99.03\%$, $Q = 124977.16$, $df = 1210$, $p = 0.0000$

Comparison of Model 3 with the null model

Total between-study variance (intercept only)

$\tau^2 = 0.1178$, $\tau = 0.3432$, $I^2 = 99.20\%$, $Q = 152683.05$, $df = 1220$, $p = 0.0000$

Proportion of total between-study variance explained by Model 3

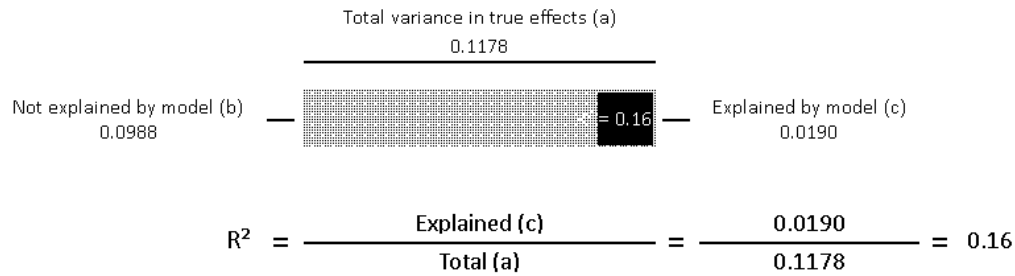
R^2 analog = 0.16

Number of studies in the analysis 1221

As we can observe from the above table four out of the ten covariates are significant for the effect size. From all the covariates that are significant one, Inequality, has a strong negative effect compared to the rest and another one, DemoSq, has an almost strong positive effect compared to the rest. The test of the model tells us that the effect size does differ by subgroup membership that is for example if a study included a measure of inequality or not is important and so on for the rest of the covariates. The Goodness of fit test tells us that the unexplained variance of the true effects is not zero and so the true effect size varies from study to study, even within subgroups. Put another way, the model is incomplete

– knowing whether a study includes a measure of economic freedom or not for example does not allow us to completely predict its effect size and the same goes for the rest of the covariates. The I^2 statistic is 99.03%, which means that nearly all of the observed variance that remains (that is, within subgroups) reflects real differences in study effects.

R^2 for Model 3, Random effects (MM), Z-Distribution, Fisher's Z



(a) To compute the total variance (of all studies about the grand mean) we run the regression with no covariates.

(b) To compute the variance not explained by the model (of all studies about the regression line) we run the regression with the covariates.

(c) The difference between these values gives us the variance explained by the model.

As we can see from the above graph $R^2=0.16$, which means that only 16% of the variance in true effects can be explained by the covariates of model 3. This means that there is an 84% of unexplained variance by Model 3 and its covariates, which is why we are going to perform the same MRA for another model with another set of covariates that might explain these differences in the true effect sizes among the different studies.

Model 4

In Model 4 we include 10 covariates that have to do mainly with the estimation differences and the specification differences of the primary studies pertaining to the use or not of OLS as an estimation method and also to a number of covariates dealing with socioeconomic measures.

Fixed Effects Model

Main results for Model 4, Fixed effect, Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.0761	0.0625	-0.0464	0.1986	1.22	0.2236
Non-OLS: 1	-0.2680	0.0627	-0.3909	-0.1452	-4.28	0.0000
OLS: 1	-0.2674	0.0626	-0.3900	-0.1448	-4.28	0.0000
Endogenous: 1	0.0432	0.0035	0.0364	0.0500	12.42	0.0000
Inflation: 1	0.1713	0.0041	0.1632	0.1795	41.36	0.0000
Convergence: 1	0.0091	0.0036	0.0021	0.0161	2.56	0.0104
Openness: 1	-0.4707	0.0033	-0.4772	-0.4641	-141.02	0.0000
Govt. Size: 1	0.2406	0.0034	0.2338	0.2473	69.80	0.0000
lagdep: 1	-0.0246	0.0027	-0.0300	-0.0193	-9.04	0.0000
lags: 1	0.2220	0.0036	0.2150	0.2289	62.47	0.0000
time: 1	0.0069	0.0024	0.0022	0.0116	2.85	0.0043

Analysis of variance

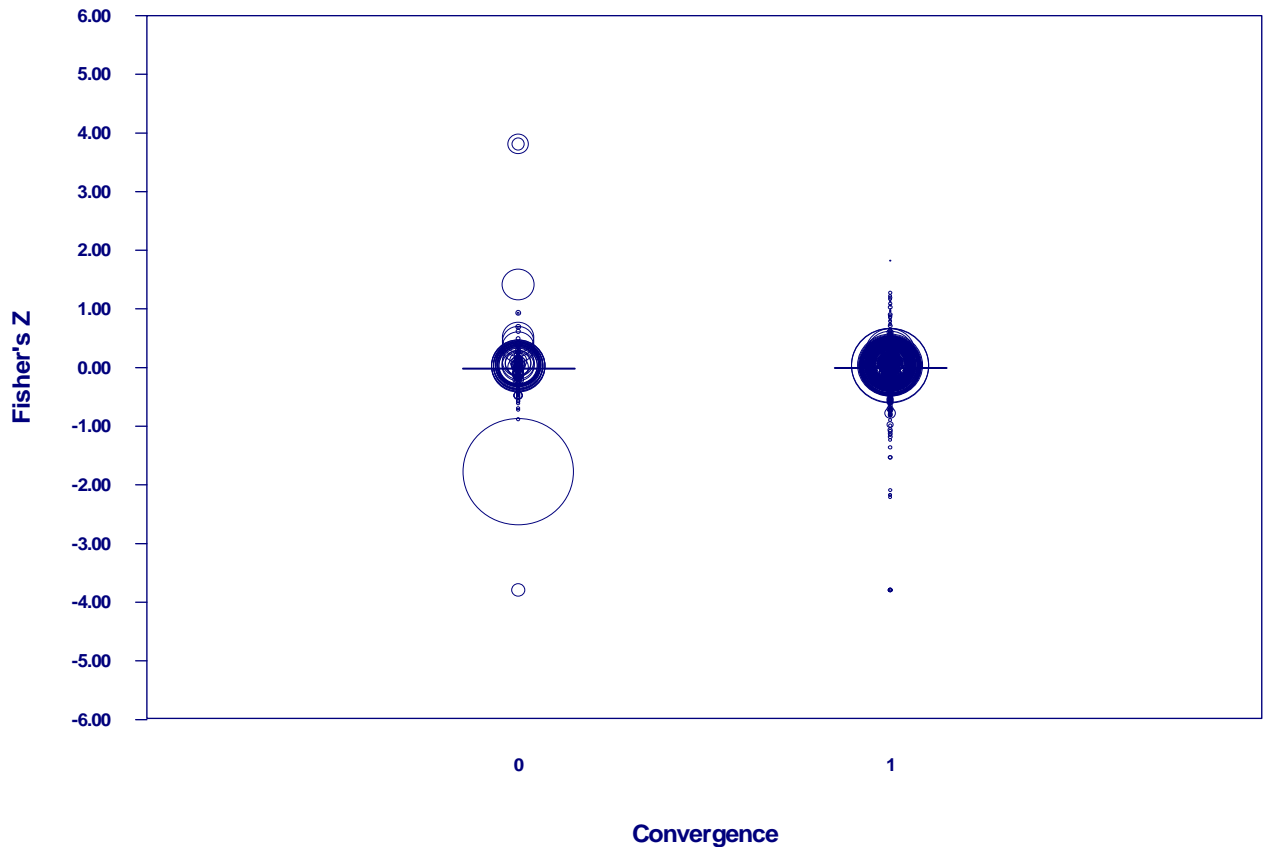
	Q	df	p
Model	35783.4228	10.0000	0.0000
Residual	116899.6305	1210.0000	0.0000
Total	152683.0532	1220.0000	0.0000

Number of studies in the analysis 1221

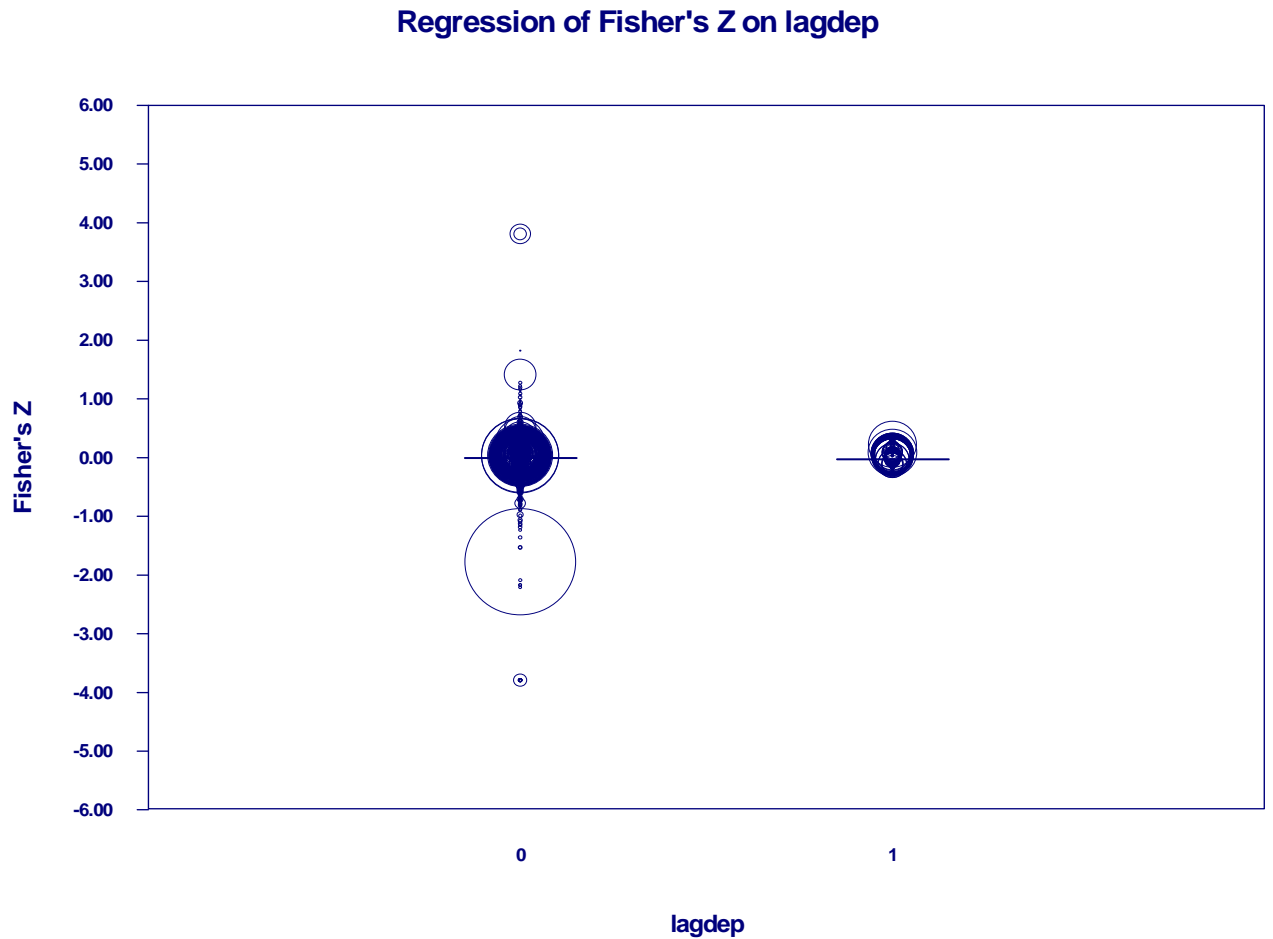
As we can observe from the above table all the covariates are significant for the effect size. From all the covariates that are significant one, Openness, has a strong negative effect compared to the rest and another one, Govt. Size, has a medium positive effect compared to the rest.

Below we are going to present two graphs that show us the regression of Fisher's Z on two of our covariates as we have done and explained before. The two covariates chosen in this case were Convergence and lagdep because we wanted to see the direction of the effect size as a function of the subgroup of studies including a measure of the initial income of the country at the period of interest and as a function of the subgroup of studies including a lag of the dependent variable that is a lag of growth.

Regression of Fisher's Z on Convergence



In our sample of studies the mean effect size for a study that included a measure of the initial income of each country included in the study is shown by the regression line which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot almost all of the big primary studies including a measure of the initial income with very few exceptions of small studies fall directly on the regression line or they are intersecting it which means that almost all of them have effect sizes very close to the mean if not exactly equal to it with a minimal dispersion about the mean.



In our sample of studies the mean effect size for a study that included a lag of growth is shown by the regression line which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot almost all of the primary studies including a lag of growth with no exception at all fall directly on the regression line or they are intersecting it which means that all of them have effect sizes very close to the mean if not exactly equal to it.

Random Effects Model

Main results for Model 4, Random effects (MM), Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.1199	0.1683	-0.2099	0.4496	0.71	0.4762
Non-OLS: 1	-0.0286	0.1751	-0.3719	0.3147	-0.16	0.8703
OLS: 1	-0.0551	0.1709	-0.3901	0.2798	-0.32	0.7470
Endogenous: 1	-0.1070	0.0440	-0.1933	-0.0207	-2.43	0.0151
Inflation: 1	-0.2035	0.0291	-0.2605	-0.1465	-7.00	0.0000
Convergence: 1	-0.0250	0.0293	-0.0825	0.0325	-0.85	0.3940
Openness: 1	0.0516	0.0262	0.0003	0.1029	1.97	0.0485
Govt. Size: 1	-0.0990	0.0249	-0.1479	-0.0501	-3.97	0.0001
lagdep: 1	0.0984	0.0330	0.0337	0.1630	2.98	0.0029
lags: 1	0.0138	0.0254	-0.0360	0.0636	0.54	0.5871
time: 1	0.0600	0.0233	0.0144	0.1056	2.58	0.0100

Statistics for Model 4

Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero

$Q = 140.66$, $df = 10$, $p = 0.0000$

Goodness of fit: Test that unexplained variance is zero

$\tau^2 = 0.0930$, $\tau = 0.3050$, $I^2 = 98.96\%$, $Q = 116899.63$, $df = 1210$, $p = 0.0000$

Comparison of Model 4 with the null model

Total between-study variance (intercept only)

$\tau^2 = 0.1178$, $\tau = 0.3432$, $I^2 = 99.20\%$, $Q = 152683.05$, $df = 1220$, $p = 0.0000$

Proportion of total between-study variance explained by Model 4

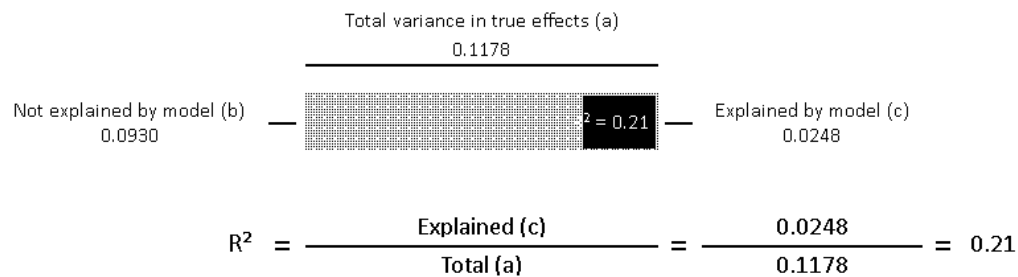
$R^2 \text{ analog} = 0.21$

Number of studies in the analysis 1221

As we can observe from the above table five out of the ten covariates are significant for the effect size and one is marginally significant whereas the remaining four are not significant. From all the covariates that are significant one, Inflation, has a pronounced negative effect compared to the rest and another one, Endogenous, has a noticeable negative effect compared to the rest. The test of the model tells us that the effect size does differ by subgroup membership that is for example if a study included a measure of inflation or not is important and so on for the rest of the covariates. The Goodness of fit test

tells us that the unexplained variance of the true effects is not zero and so the true effect size varies from study to study, even within subgroups. Put another way, the model is incomplete – knowing whether a study was estimated with OLS or not for example does not allow us to completely predict its effect size and the same goes for the rest of the covariates. The I^2 statistic is 98.96%, which means that nearly all of the observed variance that remains (that is, within subgroups) reflects real differences in study effects.

R^2 for Model 4, Random effects (MM), Z-Distribution, Fisher's Z



(a) To compute the total variance (of all studies about the grand mean) we run the regression with no covariates.

(b) To compute the variance not explained by the model (of all studies about the regression line) we run the regression with the covariates.

(c) The difference between these values gives us the variance explained by the model.

As we can see from the above graph $R^2=0.21$, which means that only 21% of the variance in true effects can be explained by the covariates of model 4. This means that there is a 79% of unexplained variance by Model 4 and its covariates.

In summary, based on the R^2 values of our four RE models we can safely say that Model 1 is the best at explaining the variance in true effects through its set of covariates since it explains 30% of the variance and a close second is Model 4 which explains through its covariates 21% of the variance. However, still a lot of the variance remains unexplained which means that there could be other covariates that haven't been tested yet that would explain it. Also, the model statistics for the four FE models indicate that all four models explain at least some of the variance in effect size but at the same time the data in all four models are not consistent with the assumptions of the fixed effect model.

5.2 BEST SET

In this section we are going to present the results from the analysis of the BEST SET both the meta-analysis results and the MRA results.

5.2.1. Meta-analysis Results

Table 4

Model		Effect size and 95% confidence interval			Test of null [2-Tail]		Heterogeneity Test			
Model	Number studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df(Q)	P-value	I-squared
Fixed	110	-0.506	-0.511	-0.501	-172.738	0.000	69184.163	109	0.000	99.842
Random	110	0.009	-0.161	0.178	0.099	0.921				

As we can see from the above table the fixed effects model overall summary result of -0.506 has a Z-value of -172.738 and a p-value of 0.000; thus, we can safely reject the null hypothesis that the effect size, which is the correlation in our case, is 0.0 (or equivalently that there is no effect of democracy on growth). Assuming that the 110 studies are valid we can conclude that democracy probably does affect growth quite a lot and according to the sign of the point estimate this effect is negative. Moreover, according to Cohen's guidelines an absolute value of more than 0.40 indicates a strong effect size and since the absolute value of the combined effect size here is 0.51 we can safely say that the magnitude of our effect is quite strong and so democracy does affect growth in a prominent negative manner.

On the other hand, the random effects model overall summary result of 0.009 has a Z-value of -0.099 and a p-value of 0.921; thus, we cannot reject the null hypothesis that the effect size, which is the correlation in our case, is 0.0 (or equivalently that there is no effect of democracy on growth). Assuming

that the 110 studies are valid we can safely conclude that democracy probably does not affect growth even by a little.

Looking at the heterogeneity test the Q statistic, which refers to both the fixed and random effects models, has a value of 69184.163 with 109 degrees of freedom and a p-value of 0.000, which means that we must reject the null hypothesis of homogeneity and come to the conclusion that there is heterogeneity in the dispersion of the effects among our 110 studies and so the dispersion is not due only to differences in the sample size of each study but also to some real differences in the true effect size of each study. This also means that we must reject the fixed effects model as a valid statistical model in our case and keep the conclusions that are derived from the random effects model. Moreover, due to the construction of our BEST SET sample, which includes the best 110 regression estimates out of all the individual effect sizes from all the models used in all the studies, we can safely reject the fixed effects model as the appropriate model to use here since the majority of the 110 studies included come from different authors having used a variety of methodologies and different samples and do not always measure the exact same relationship between democracy and growth in the exact same way and thus also reject the conclusions derived from the fixed effects model. In our case, we come to the conclusion that there is a zero combined effect of democracy on growth based on the RE statistical model, which is the appropriate one to use here.

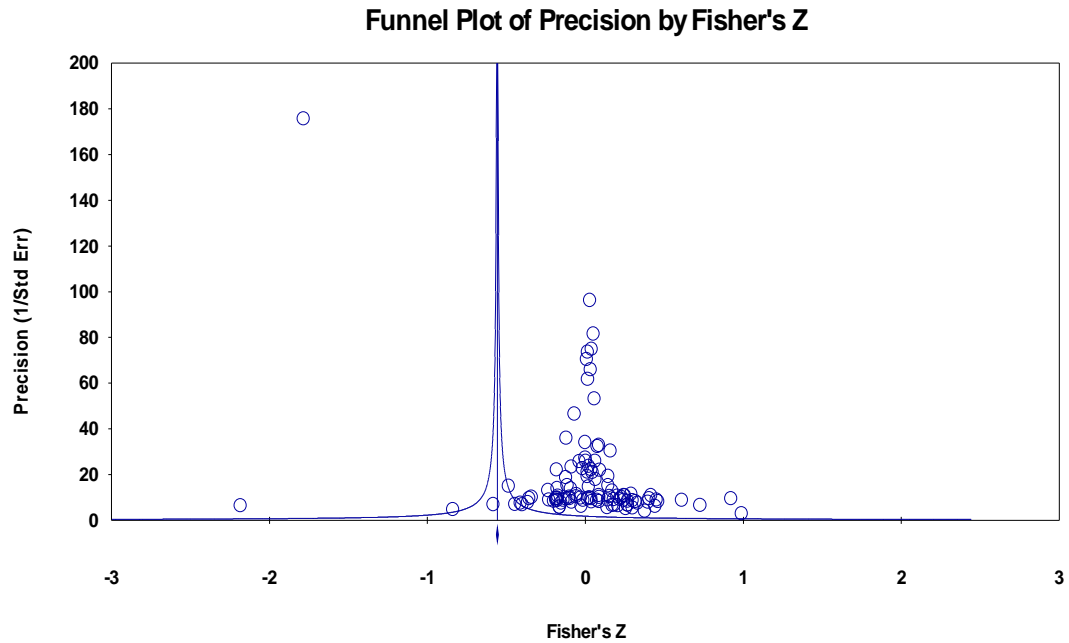
Finally, looking at the I^2 value, which is a proportion referring only to the random effects model we conclude that if we were able to remove all the sampling error from our studies the dispersion pattern, which is the variance of the dispersion, would be almost 100% the same, which verifies the conclusion we derived from our Q-test that there are indeed real differences of the true effects among our studies.

We are not able to present the forest plot here due to the big number of studies included in our sample but were you to see the screen of the CMA software where the forest plot was calculated and also see it sorted by sample size you would immediately realize that the effect size is minor near zero toward the top of the forest plot where the studies with the largest samples cluster and larger as extreme as 0.757 for studies toward the bottom of the forest plot where the studies with the smallest samples cluster. This shows us that the effect that democracy has on growth even if it is significant is very small, close to zero, for studies with large samples that would avoid sampling error.

When we sort our forest plot by earliest year of publication of our studies we immediately realize that the effect size is greater toward the top of the forest plot where the earliest publicized studies cluster and smaller as minor as 0.009 for studies toward the bottom of the forest plot where the latest publicized studies cluster. This shows us that the effect that democracy has on growth even if it is significant is very small, close to zero, for the latest studies especially of the last decade, which usually have the largest samples compared to some of the earliest studies back in the 80's, which seem to have overestimated the effect of democracy on growth mainly because they were based on smaller samples.

Publication Bias

If we check for publication bias by the use of the funnel plot of precision by Fisher's Z as is shown below we are going to realize that there is a remarkable publication bias since as is obvious from the graph almost all of the studies fall asymmetrically to the right of the central axis which is centered at the mean effect size around -0.5.



This is probably due to the fact that we now have one model per study, the benchmark model, and so now the majority of the studies are quite different and do not share as many common characteristics as before in the ALL SET analysis where all of the models of all the studies were included in the analysis thus making the set more homogeneous in certain characteristics.

Classic fail-safe N

Classic fail-safe N

Z-value for observed studies	-26.23337
P-value for observed studies	0.00000
Alpha	0.05000
Tails	2.00000
Z for alpha	1.95996
Number of observed studies	110.00000
Number of missing studies that would bring p-value to > alpha	9597.00000

This meta-analysis incorporates data from 110 studies, which yield a z-value of -26.23337 and a corresponding 2-tailed p-value of 0.00000.

The fail-safe N is 19597. This means that we would need to locate and include 19597 'null' studies in order for the combined 2-tailed p-value to exceed 0.050.

Put another way, we would have to have 178.2 missing studies for every observed study for the effect to be nullified.

Thus, we can safely say that there is no discernible publication bias at all.

Begg and Mazumdar Rank Correlation Test

Begg and Mazumdar rank correlation

Kendall's S statistic (P-Q)	.3449.00000
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Kendall's tau without continuity correction

Tau	-0.57550
z-value for tau	8.90899
P-value (1-tailed)	0.00000
P-value (2-tailed)	0.00000

Kendall's tau with continuity correction

Tau	-0.57534
z-value for tau	8.90641
P-value (1-tailed)	0.00000
P-value (2-tailed)	0.00000

In this case Kendall's tau b (corrected for ties, if any) is -0.57550, with a 1-tailed p-value (recommended) of 0.00000 or a 2-tailed p-value of 0.00000 (based on continuity-corrected normal

approximation) which means that it is significant and since its value is large we can safely say that there is strong publication bias.

Egger's Test of the Intercept

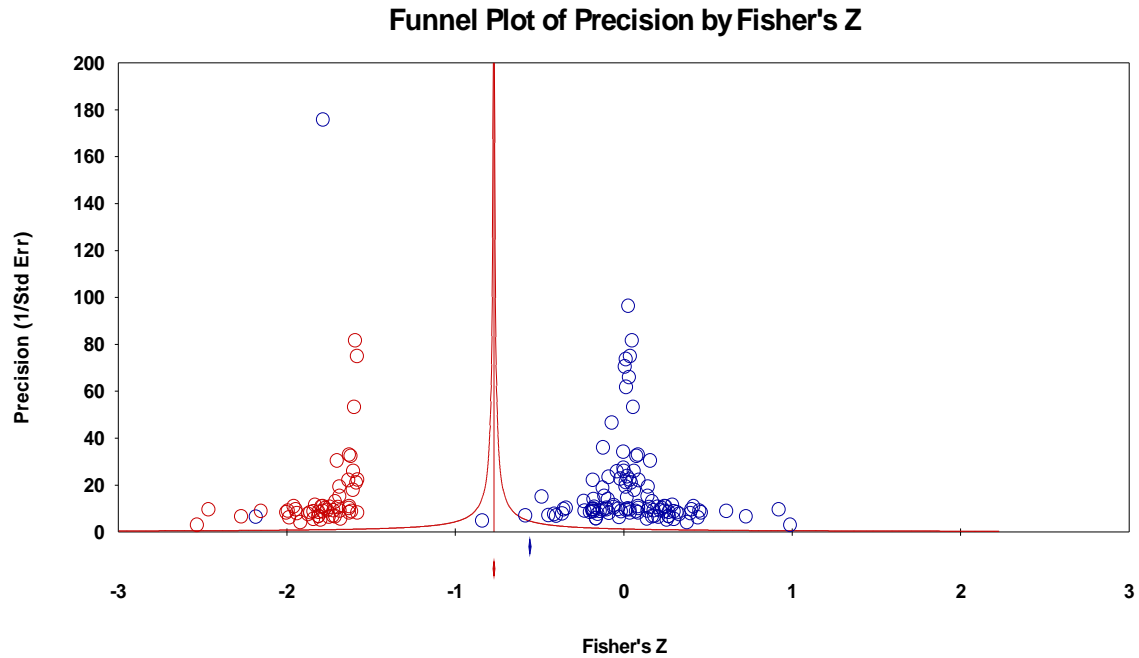
Egger's regression intercept

Intercept	12.66821
Standard error	2.83316
95% lower limit (2-tailed)	7.05241
95% upper limit (2-tailed)	18.28402
t-value	4.47141
df	108.00000
P-value (1-tailed)	0.00001
P-value (2-tailed)	0.00002

In this case the intercept (B_0) is 12.66821, 95% confidence interval (7.05241, 18.28402), with $t=4.47141$, $df=108$. The 1-tailed p-value (recommended) is 0.00001, and the 2-tailed p-value is 0.00002 which means that Egger's regression intercept in this case is significant and thus we can say that there is a remarkable publication bias since the value of the intercept is quite large.

Duval and Tweedie's Trim and Fill

The algorithm is looking for missing studies based on a fixed effect model, and is looking for missing studies only to the left side of the mean effect (these parameters are set by the user). Using these parameters the method suggests that 52 studies are missing. This is quite a big number compared to the observed number of studies as we can see below in the Funnel Plot. In fact, it is about half the number of the observed studies.



Under the fixed effect model the point estimate and 95% confidence interval for the combined studies is -0.50582 (-0.51051, -0.50110). Using Trim and Fill the imputed point estimate is -0.64717 (-0.65044, -0.64387).

Under the random effects model the point estimate and 95% confidence interval for the combined studies is 0.00869 (-0.16120, 0.17809). Using Trim and Fill the imputed point estimate is -0.51295 (-0.60980, -0.40101).

Again we can safely conclude based on the above results that there is a very big publication bias.

5.2.2. MRA Results

Model 1

In Model 1 we include 10 covariates that have to do mainly with the data differences of the primary studies, the knowledge effects seeping through the studies and some other covariates such as Politics and Primary that have to do with the publication and the main aims of each study.

Fixed Effects Model

Main results for Model 1, Fixed effect, Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	24.6490	1.9040	20.9173	28.3807	12.95	0.0000
Cross-section pooled data: 1	-0.1017	0.1034	-0.3044	0.1009	-0.98	0.3252
Panel Data: 1	0.0641	0.1024	-0.1367	0.2648	0.63	0.5315
NoYears	0.0030	0.0002	0.0027	0.0033	17.45	0.0000
Single: 1	-0.3951	0.1314	-0.6526	-0.1376	-3.01	0.0026
Politics: 1	0.0956	0.0116	0.0729	0.1182	8.26	0.0000
Primary: 1	-0.2449	0.0116	-0.2676	-0.2222	-21.13	0.0000
Crossauthor: 1	0.6739	0.0107	0.6528	0.6949	62.75	0.0000
Prior: 1	0.6812	0.0099	0.6618	0.7005	69.05	0.0000
lgoog_pa	-0.6021	0.0063	-0.6144	-0.5898	-95.98	0.0000
Year	-0.0121	0.0009	-0.0139	-0.0102	-12.70	0.0000

Analysis of variance

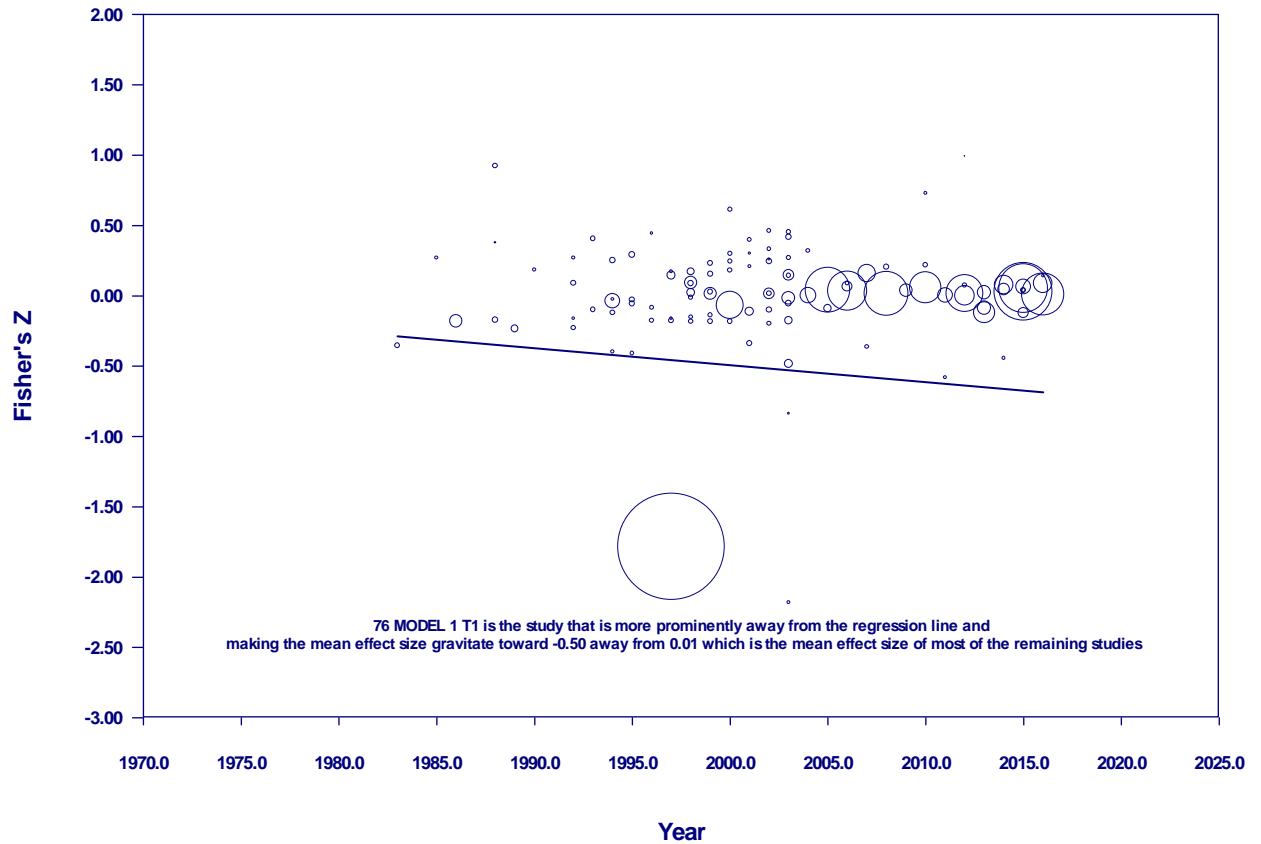
	Q	df	p
Model	58541.0380	10.0000	0.0000
Residual	10643.1247	99.0000	0.0000
Total	69184.1628	109.0000	0.0000

Number of studies in the analysis 110

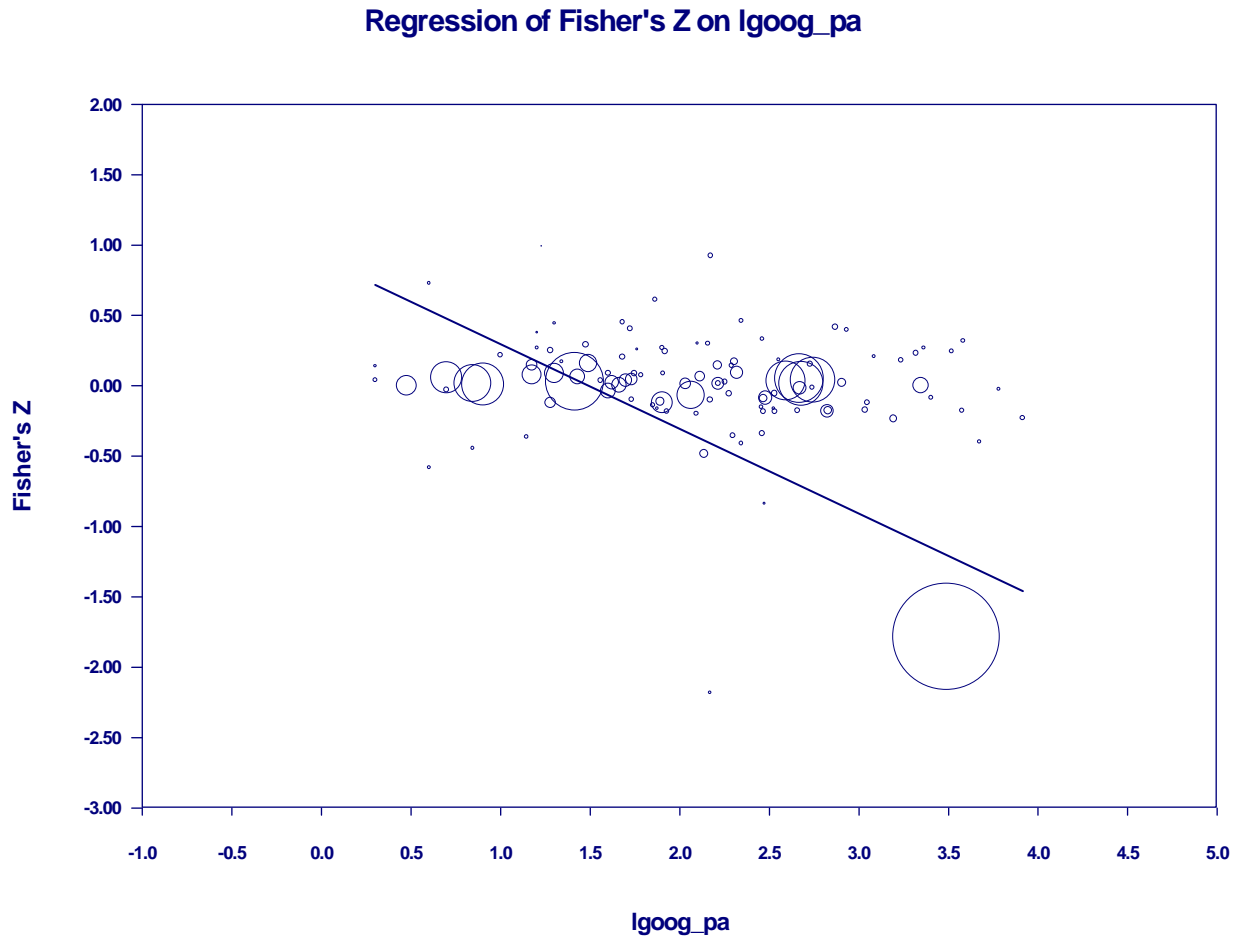
As we can observe from the above table all the covariates except two, cross-section pooled data and panel data, are significant for the effect size. From those that are significant two, single and lgoog_pa, have a strong to very strong negative effect compared to the rest whereas another pair, crossauthor and prior, have a very strong positive effect compared to the rest.

Below we are going to present two graphs that show us the regression of Fisher's Z on two of our covariates so that we can also see graphically how wide is the dispersion of the effects of individual primary studies around the regression line, which represents the mean effect of our whole sample of primary studies and also get a better sense of the direction of the effect size as a function of covariates. The two covariates chosen in this case were Year and lgoog_pa because we wanted to see the direction of the effect size as a function of year of publication and as a function of the log citation score that they received based on the number of their Google Scholar citations.

Regression of Fisher's Z on Year



In our sample of studies the mean effect size for a study at any given year is indicated by the regression line. As we can see from the above scatterplot almost all of the primary studies fall away from the regression line either mainly above it or below it which means that most of them have effect sizes away from the mean. In fact, one very big study seems to be the culprit for making the mean effect move away from -0.10 to -0.50 as is obvious from the graph. Also most of the big studies that are clustering above the regression line are toward the right of the regression line indicating the fact that the majority of studies with large samples have been done in recent years.



In our sample of studies the mean effect size for a study at any given log citation score is indicated by the regression line. As we can see from the above scatterplot the majority of the primary studies fall away from the regression line which has a very steep negative slope indicating that the mean effect size is changing inversely proportional to the log citation score. In fact, one very big study seems to be the culprit for making the mean effect size, which is represented by the regression line behave in such a peculiar manner as is obvious from the graph. This study is the same one that we have encountered before and it has one of the biggest log citation scores, which means that it has a great number of citations in Google Scholar.

Random Effects Model

Main results for Model 1, Random effects (MM), Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	5.7959	16.3027	-26.1568	37.7486	0.36	0.7222
Cross-section pooled data: 1	-0.0348	0.5436	-1.1003	1.0307	-0.06	0.9490
Panel Data: 1	-0.0100	0.5254	-1.0398	1.0197	-0.02	0.9847
NoYears	0.0000	0.0026	-0.0051	0.0051	0.01	0.9916
Single: 1	-0.2960	0.6039	-1.4797	0.8877	-0.49	0.6241
Politics: 1	-0.0007	0.1042	-0.2050	0.2035	-0.01	0.9945
Primary: 1	-0.0129	0.1115	-0.2313	0.2056	-0.12	0.9082
Crossauthor: 1	0.0605	0.1197	-0.1740	0.2951	0.51	0.6130
Prior: 1	0.0831	0.1289	-0.1695	0.3357	0.64	0.5192
lgoog_pa	-0.1281	0.0779	-0.2807	0.0245	-1.65	0.0998
Year	-0.0028	0.0081	-0.0187	0.0132	-0.34	0.7331

Statistics for Model 1

Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero

Q = 4.02, df = 10, p = 0.9463

Goodness of fit: Test that unexplained variance is zero

$\tau^2 = 0.2543$, $\tau = 0.5042$, $I^2 = 99.07\%$, Q = 10643.12, df = 99, p = 0.0000

Comparison of Model 1 with the null model

Total between-study variance (intercept only)

$\tau^2 = 0.8281$, $\tau = 0.9100$, $I^2 = 99.84\%$, Q = 69184.16, df = 109, p = 0.0000

Proportion of total between-study variance explained by Model 1

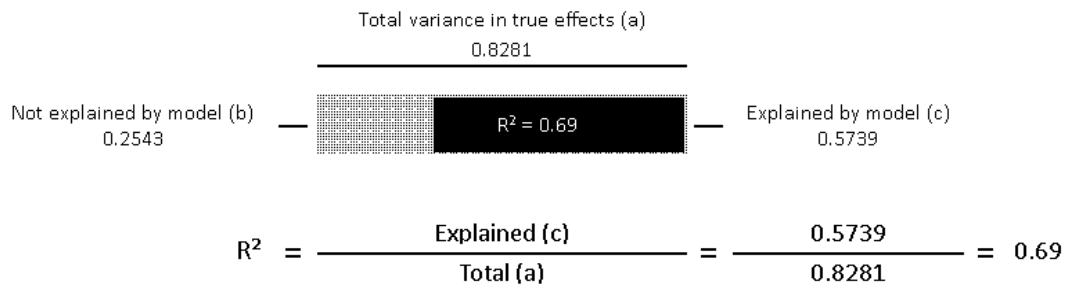
R^2 analog = 0.69

Number of studies in the analysis 110

As we can observe from the above table all of the covariates without exceptions are not significant for the effect size. The test of the model tells us that the effect size does not differ by subgroup membership that is for example if a study was conducted using panel data or not is not important for the effect size and so on for the rest of the covariates. The Goodness of fit test tells us that the unexplained variance of the true effects is not zero and so the true effect size varies from study to study, even within subgroups. Put another way, the model is incomplete – knowing whether a study falls into the Primary or

not Primary subgroup for example does not allow us to completely predict its effect size and the same goes for the rest of the covariates. The I^2 statistic is 99.07%, which means that nearly all of the observed variance that remains (that is, within subgroups) reflects real differences in study effects.

R^2 for Model 1, Random effects (MM), Z-Distribution, Fisher's Z



- (a) To compute the total variance (of all studies about the grand mean) we run the regression with no covariates.
 (b) To compute the variance not explained by the model (of all studies about the regression line) we run the regression with the covariates.
 (c) The difference between these values gives us the variance explained by the model.

As we can see from the above graph $R^2=0.69$ which means that 69% of the variance in true effects can be explained by the covariates of model 1. This means that there is only a 31% of unexplained variance by Model 1 and its covariates which is exactly the opposite relationship from the one we encountered when we analyzed Model 1 with the ALL SET studies.

Model 2

In Model 2 we include 10 covariates that have to do mainly with the data differences of the primary studies pertaining to the time period of data retrieval and the country composition in the sample of each study.

Fixed Effects Model**Main results for Model 2, Fixed effect, Z-Distribution, Fisher's Z**

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.7574	0.0349	0.6890	0.8258	21.70	0.0000
LA: 1	0.2509	0.0351	0.1822	0.3196	7.16	0.0000
Africa: 1	-0.1522	0.0329	-0.2167	-0.0877	-4.62	0.0000
Asia: 1	0.4773	0.0316	0.4153	0.5393	15.09	0.0000
Developed: 1	-1.0659	0.0207	-1.1064	-1.0254	-51.61	0.0000
1970's: 1	-0.2876	0.0136	-0.3141	-0.2610	-21.19	0.0000
1980's: 1	-0.3281	0.0231	-0.3733	-0.2829	-14.23	0.0000
1990's: 1	-1.0512	0.0144	-1.0794	-1.0230	-73.14	0.0000
2000's: 1	0.9970	0.0084	0.9805	1.0136	118.07	0.0000
2010's: 1	-0.3568	0.0310	-0.4176	-0.2959	-11.49	0.0000
NoCountries	0.0023	0.0001	0.0021	0.0026	17.99	0.0000

Analysis of variance

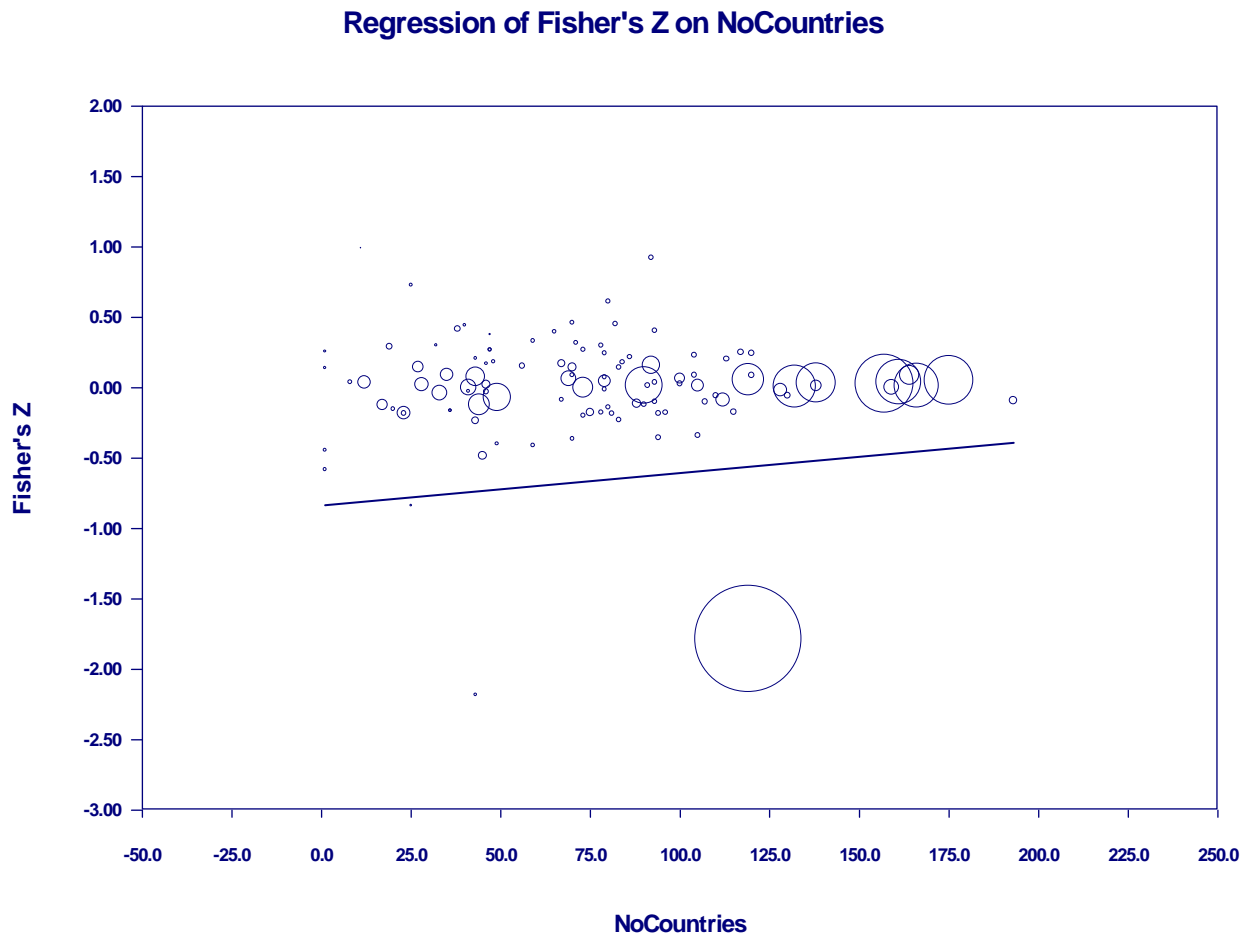
	Q	df	p
Model	31785.1255	10.0000	0.0000
Residual	37399.0372	99.0000	0.0000
Total	69184.1628	109.0000	0.0000

Number of studies in the analysis 110

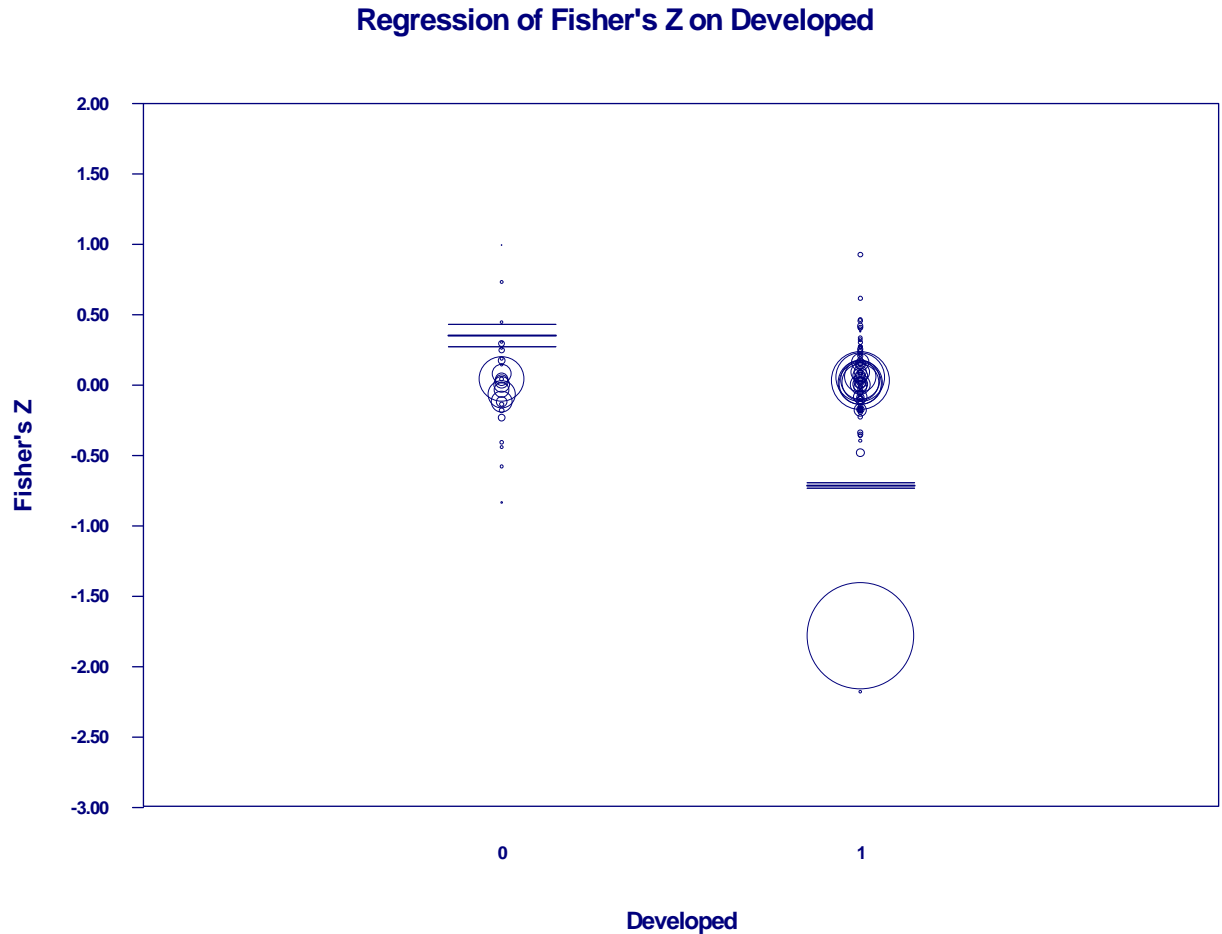
As we can observe from the above table all of the covariates are significant for the effect size. From all the covariates that are significant two, Developed and 1990's, have an extremely strong negative effect compared to the rest whereas only one, 2000's, has also an extremely strong positive effect compared to the rest.

Below we are going to present two graphs that show us the regression of Fisher's Z on two of our covariates so that we can also see graphically how wide is the dispersion of the effects of individual primary studies around the regression line, which represents the mean effect of our whole sample of primary studies and also get a better sense of the direction of the effect size as a function of covariates. The two covariates chosen in this case were NoCountries and Developed because we wanted to see the

direction of the effect size as a function of the number of countries included in the primary studies and as a function of the subgroup of studies including developed countries.



In our sample of studies the mean effect size for a study at any given NoCountry is indicated by the regression line. As we can see from the above scatterplot the majority of the primary studies fall away from the regression line which has a slightly positive slope indicating that the mean effect size is changing somewhat proportional to the number of countries included in a study. In fact, one very big study seems to be the culprit for making the mean effect size, which is represented by the regression line behave in such a manner as is obvious from the graph. This study is the same one that we have encountered before and it includes a large number of countries compared to the other ones.



In our sample of studies the mean effect size for a study that included developed countries is shown by the regression line which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot almost all of the primary studies including developed countries fall above the regression line and close to the 0.0 effect size whereas one big study the same one we have been encountering in the last few scatterplots falls far below the regression line and is the main reason for the mean effect size to be -0.50. If it wasn't for this study the regression line would pass through the 0.0 effect size point estimate.

Random Effects Model

Main results for Model 2, Random effects (MM), Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.0385	0.3096	-0.5683	0.6453	0.12	0.9010
LA: 1	0.0177	0.3974	-0.7611	0.7965	0.04	0.9645
Africa: 1	0.0109	0.3143	-0.6051	0.6269	0.03	0.9723
Asia: 1	0.0775	0.3542	-0.6167	0.7716	0.22	0.8269
Developed: 1	-0.0869	0.2867	-0.6488	0.4749	-0.30	0.7617
1970's: 1	-0.0911	0.2652	-0.6109	0.4287	-0.34	0.7312
1980's: 1	0.0643	0.2579	-0.4411	0.5698	0.25	0.8030
1990's: 1	-0.2086	0.1866	-0.5742	0.1570	-1.12	0.2635
2000's: 1	0.1132	0.2426	-0.3624	0.5887	0.47	0.6409
2010's: 1	-0.0789	0.4535	-0.9677	0.8099	-0.17	0.8619
NoCountries	0.0005	0.0024	-0.0041	0.0052	0.23	0.8206

Statistics for Model 2

Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero

Q = 1.56, df = 10, p = 0.9987

Goodness of fit: Test that unexplained variance is zero

$\tau^2 = 0.6562$, $\tau = 0.8101$, $I^2 = 99.74\%$, Q = 37399.04, df = 99, p = 0.0000

Comparison of Model 2 with the null model

Total between-study variance (intercept only)

$\tau^2 = 0.8281$, $\tau = 0.9100$, $I^2 = 99.84\%$, Q = 69184.16, df = 109, p = 0.0000

Proportion of total between-study variance explained by Model 2

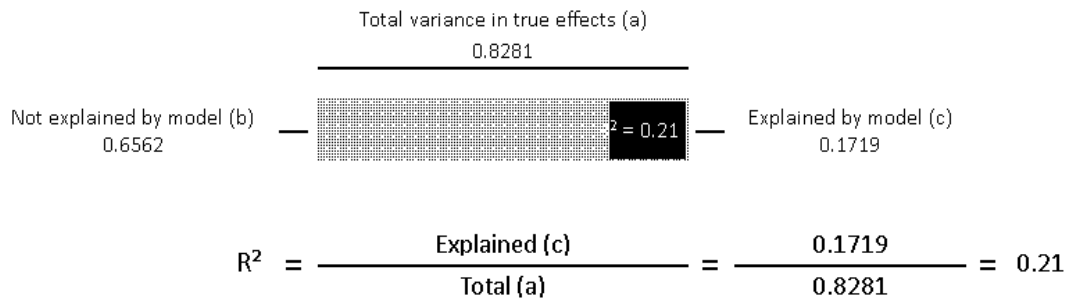
R^2 analog = 0.21

Number of studies in the analysis 110

As we can observe from the above table all of the covariates without exceptions are not significant for the effect size. The test of the model tells us that the effect size does not differ by subgroup membership that is for example if a study included countries from Africa or not is not important for the effect size and so on for the rest of the covariates. The Goodness of fit test tells us that the unexplained variance of the true effects is not zero and so the true effect size varies from study to study, even within subgroups. Put another way, the model is incomplete – knowing whether a study includes data from the 2010's or not for example does not allow us to completely predict its effect size and the same goes for

the rest of the covariates. The I^2 statistic is 99.74%, which means that nearly all of the observed variance that remains (that is, within subgroups) reflects real differences in study effects.

R^2 for Model 2, Random effects (MM), Z-Distribution, Fisher's Z



- (a) To compute the total variance (of all studies about the grand mean) we run the regression with no covariates.
- (b) To compute the variance not explained by the model (of all studies about the regression line) we run the regression with the covariates.
- (c) The difference between these values gives us the variance explained by the model.

As we can see from the above graph $R^2=0.21$ which means that only 21% of the variance in true effects can be explained by the covariates of model 2. This means that there is a 79% of unexplained variance by Model 2 and its covariates, which is why we are going to perform the same MRA for another model with another set of covariates that might explain these differences in the true effect sizes among the different studies.

Model 3

In Model 3 we include 10 covariates that have to do mainly with the data differences and the specification differences of the primary studies pertaining to measure of democracy and also a number of covariates dealing with socioeconomic measures.

Fixed Effects Model

Main results for Model 3, Fixed effect, Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.2612	0.0075	0.2466	0.2759	34.96	0.0000
Gastil: 1	-1.0909	0.0079	-1.1063	-1.0754	-138.41	0.0000
Dem.Dummy: 1	-0.2686	0.0102	-0.2885	-0.2486	-26.41	0.0000
DemoSq: 1	1.0836	0.0373	1.0106	1.1566	29.08	0.0000
Region: 1	-0.6821	0.0089	-0.6995	-0.6646	-76.71	0.0000
Ecofreedom: 1	0.1821	0.0300	0.1233	0.2409	6.07	0.0000
Inequality: 1	-0.1964	0.0967	-0.3859	-0.0070	-2.03	0.0422
Instability: 1	-0.0332	0.0613	-0.1534	0.0870	-0.54	0.5883
Population: 1	0.1310	0.0120	0.1076	0.1545	10.95	0.0000
HC: 1	0.4277	0.0129	0.4024	0.4529	33.24	0.0000
PC: 1	-0.2165	0.0119	-0.2398	-0.1931	-18.16	0.0000

Analysis of variance

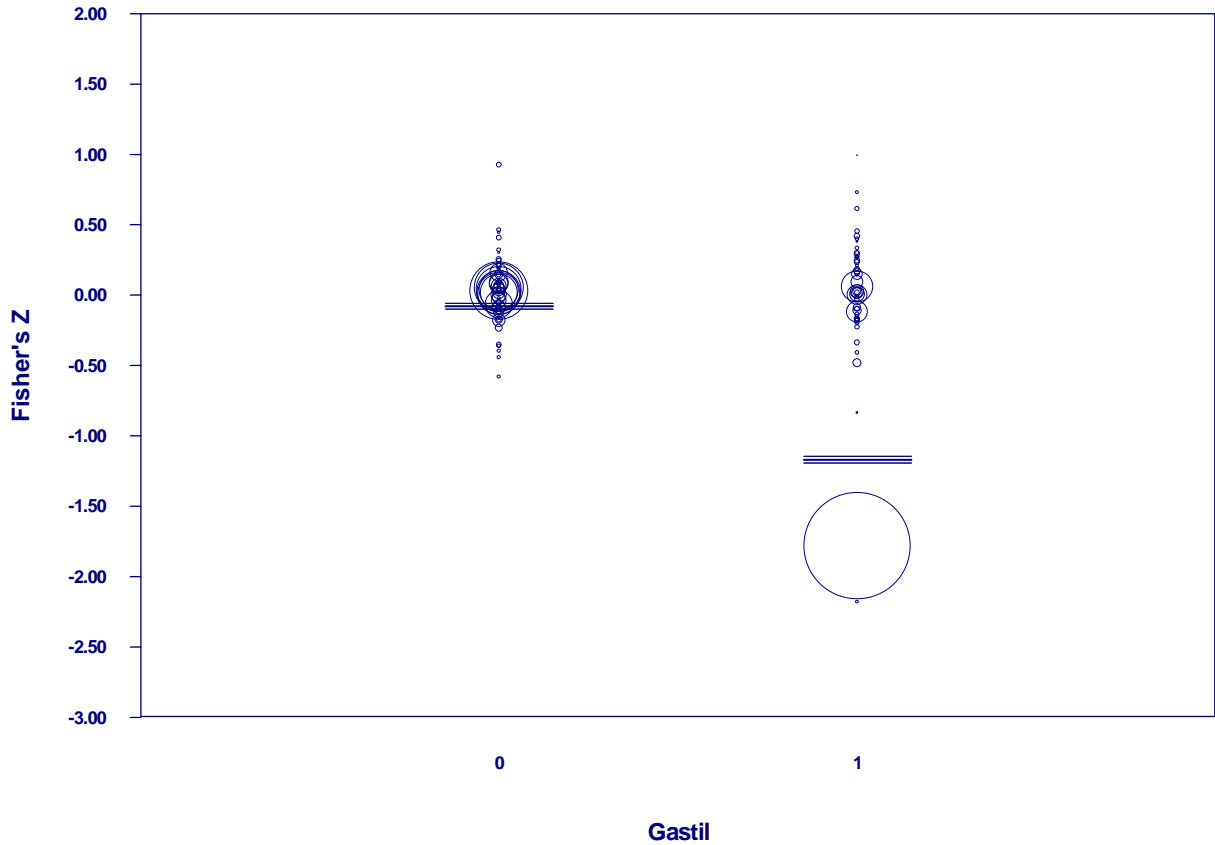
	Q	df	p
Model	53395.9113	10.0000	0.0000
Residual	15788.2515	99.0000	0.0000
Total	69184.1628	109.0000	0.0000

Number of studies in the analysis 110

As we can observe from the above table all of the covariates are significant for the effect size except one-Instability. From all the covariates that are significant one, Gastil, has an extremely strong negative effect compared to the rest and another one, DemoSq, has also an extremely strong positive effect compared to the rest.

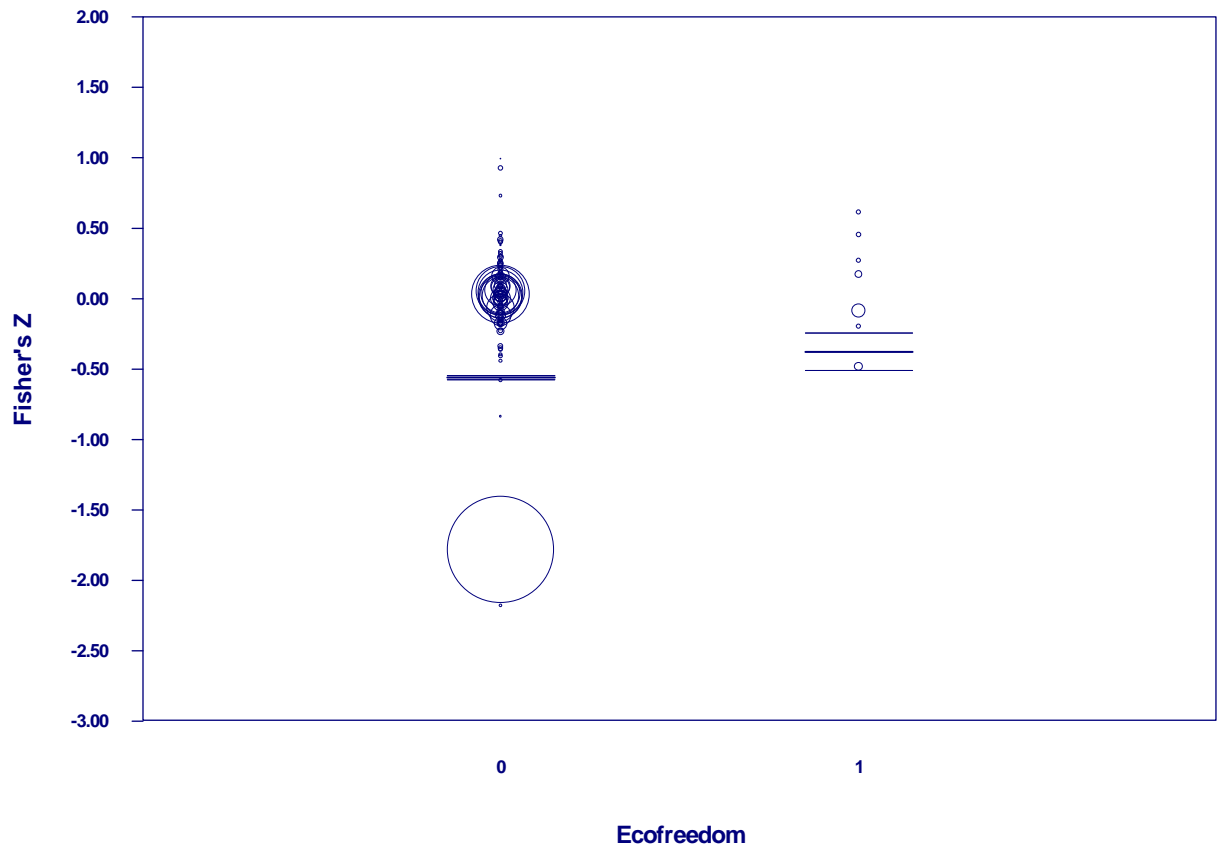
Below we are going to present two graphs that show us the regression of Fisher's Z on two of our covariates as we have done previously. The two covariates chosen in this case were Gastil and Ecofreedom because we wanted to see the direction of the effect size as a function of the subgroup of studies including the Gastil Index as a democracy measure and as a function of the subgroup of studies including an economic freedom measure.

Regression of Fisher's Z on Gastil



In our sample of studies the mean effect size for a study that included the Gastil index as a democracy measure is shown by the regression line, which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot our graph looks exactly like the one with the regression of Fisher's Z on Developed countries for similar reasons.

Regression of Fisher's Z on Ecofreedom



In our sample of studies the mean effect size for a study that included a measure of economic freedom is shown by the regression line, which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot almost all of the primary studies including some kind of an economic freedom measure with no exception fall directly above the regression line except one that falls below, which means that almost all of them have effect sizes quite away from the mean effect size.

Random Effects Model

Main results for Model 3, Random effects (MM), Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.0375	0.1119	-0.1818	0.2569	0.34	0.7373
Gastil: 1	-0.0192	0.1175	-0.2495	0.2111	-0.16	0.8700
Dem.Dummy: 1	0.0030	0.1645	-0.3195	0.3255	0.02	0.9856
DemoSq: 1	0.4798	0.2543	-0.0185	0.9782	1.89	0.0592
Region: 1	-0.0920	0.1419	-0.3701	0.1860	-0.65	0.5165
Ecofreedom: 1	0.1018	0.2382	-0.3651	0.5687	0.43	0.6693
Inequality: 1	-1.0791	0.4434	-1.9482	-0.2100	-2.43	0.0149
Instability: 1	0.0797	0.3442	-0.5950	0.7544	0.23	0.8170
Population: 1	0.0268	0.1194	-0.2072	0.2609	0.22	0.8223
HC: 1	0.0149	0.1243	-0.2288	0.2586	0.12	0.9046
PC: 1	-0.0799	0.1248	-0.3246	0.1648	-0.64	0.5223

Statistics for Model 3

Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero

Q = 9.67, df = 10, p = 0.4701

Goodness of fit: Test that unexplained variance is zero

Tau² = 0.3120, Tau = 0.5586, I² = 99.37%, Q = 15788.25, df = 99, p = 0.0000

Comparison of Model 3 with the null model

Total between-study variance (intercept only)

Tau² = 0.8281, Tau = 0.9100, I² = 99.84%, Q = 69184.16, df = 109, p = 0.0000

Proportion of total between-study variance explained by Model 3

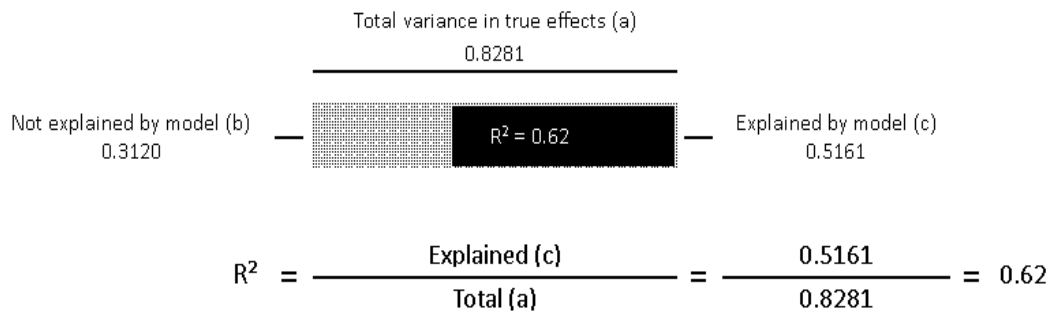
R² analog = 0.62

Number of studies in the analysis 110

As we can observe from the above table only one, Inequality, out of the ten covariates is significant for the effect size. Inequality the only covariate significant for the effect size has the strongest negative effect compared to the rest. The test of the model tells us that the effect size does not differ by subgroup membership that is for example if a study included a measure of inequality or not is not important and so on for the rest of the covariates. The Goodness of fit test tells us that the unexplained variance of the true effects is not zero and so the true effect size varies from study to study, even within subgroups. Put another way, the model is incomplete – knowing whether a study includes a measure of economic

freedom or not for example does not allow us to completely predict its effect size and the same goes for the rest of the covariates. The I^2 statistic is 99.37%, which means that nearly all of the observed variance that remains (that is, within subgroups) reflects real differences in study effects.

R^2 for Model 3, Random effects (MM), Z-Distribution, Fisher's Z



- (a) To compute the total variance (of all studies about the grand mean) we run the regression with no covariates.
- (b) To compute the variance not explained by the model (of all studies about the regression line) we run the regression with the covariates.
- (c) The difference between these values gives us the variance explained by the model.

As we can see from the above graph $R^2=0.62$ which means that 62% of the variance in true effects can be explained by the covariates of model 3. This means that there is only a 38% of unexplained variance by Model 3 and its covariates.

Model 4

In Model 4 we include 10 covariates that have to do mainly with the estimation differences and the specification differences of the primary studies pertaining to the use or not of OLS as an estimation method and also to a number of covariates dealing with socioeconomic measures.

Fixed Effects Model**Main results for Model 4, Fixed effect, Z-Distribution, Fisher's Z**

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.0537	0.0884	-0.1195	0.2270	0.61	0.5431
Non-OLS: 1	-0.0990	0.0903	-0.2759	0.0779	-1.10	0.2728
OLS: 1	-0.4273	0.0888	-0.6014	-0.2532	-4.81	0.0000
Endogenous: 1	0.0806	0.0128	0.0556	0.1056	6.32	0.0000
Inflation: 1	0.6466	0.0185	0.6104	0.6828	35.01	0.0000
Convergence: 1	0.2332	0.0125	0.2087	0.2577	18.63	0.0000
Openness: 1	-1.2550	0.0096	-1.2739	-1.2362	-130.75	0.0000
Govt. Size: 1	0.7567	0.0138	0.7298	0.7837	55.03	0.0000
lagdep: 1	-0.9010	0.0213	-0.9427	-0.8594	-42.38	0.0000
lags: 1	0.2109	0.0123	0.1868	0.2349	17.19	0.0000
time: 1	0.0171	0.0111	-0.0047	0.0389	1.54	0.1239

Analysis of variance

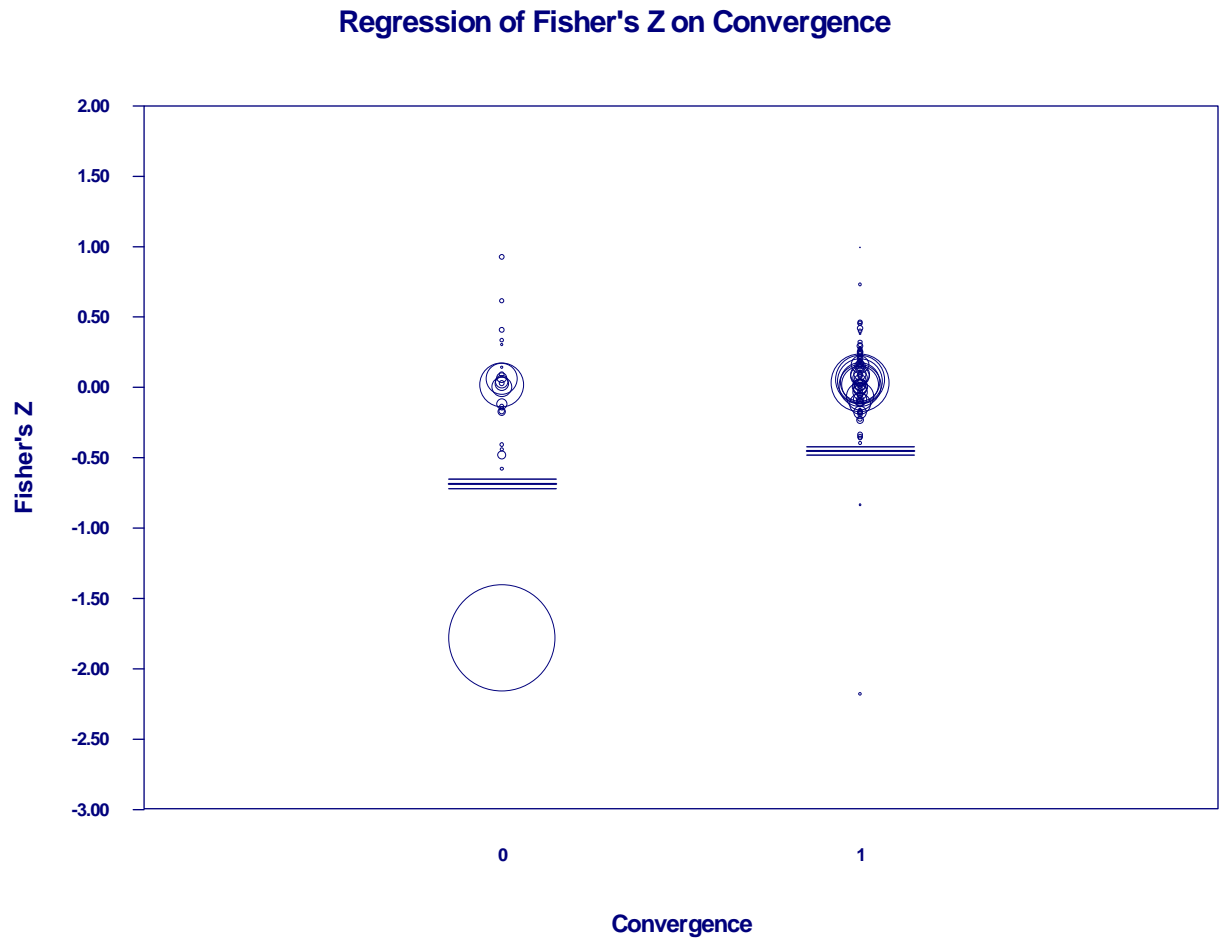
	Q	df	p
Model	59696.7172	10.0000	0.0000
Residual	9487.4456	99.0000	0.0000
Total	69184.1628	109.0000	0.0000

Number of studies in the analysis 110

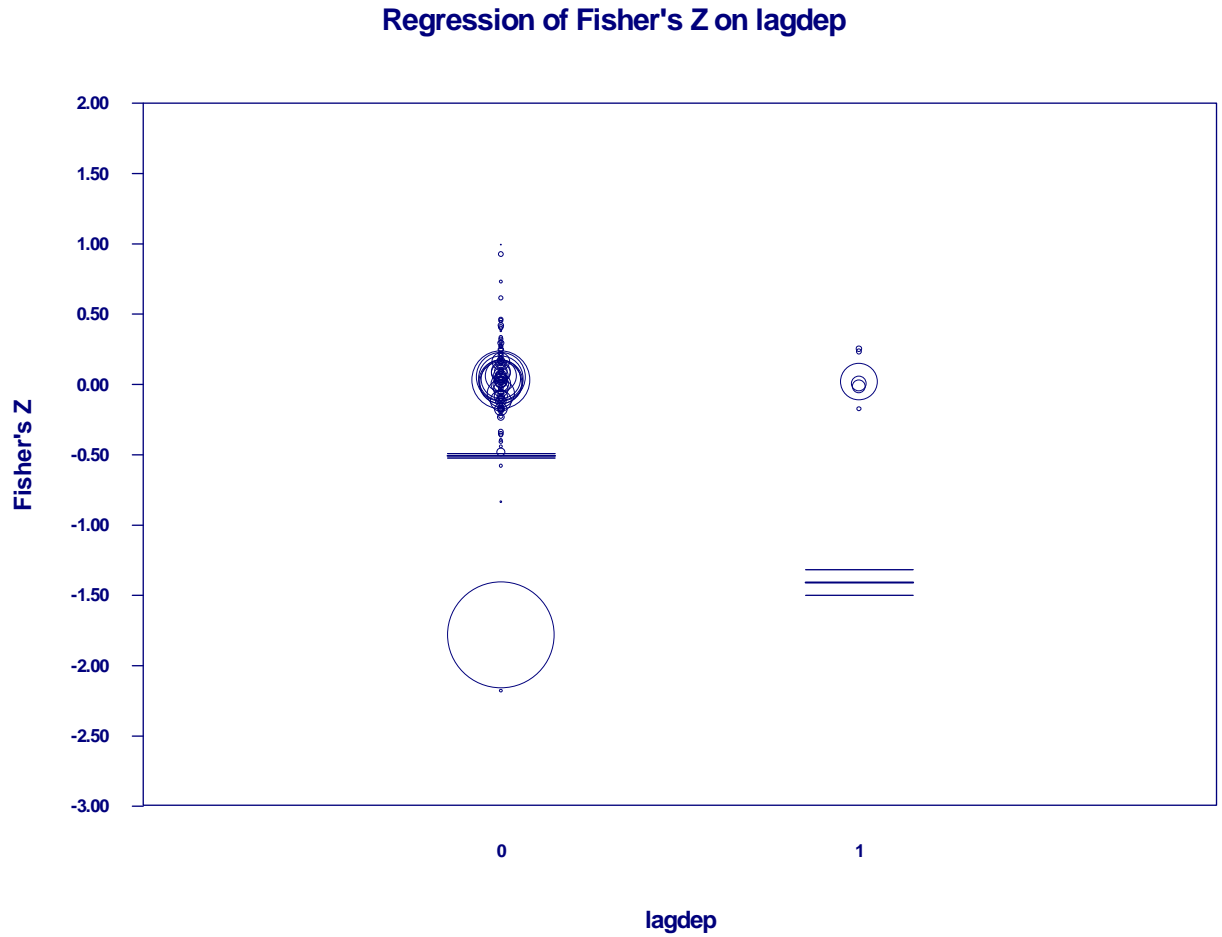
As we can observe from the above table all of the covariates except two, Non-OLS and time, are significant for the effect size. From all the covariates that are significant one, Openness, has an extremely strong negative effect compared to the rest and another one, Govt. Size, has a quite strong positive effect compared to the rest.

Below we are going to present two graphs that show us the regression of Fisher's Z on two of our covariates as we have done and explained before. The two covariates chosen in this case were Convergence and lagdep because we wanted to see the direction of the effect size as a function of the

subgroup of studies including a measure of the initial income of the country at the period of interest and as a function of the subgroup of studies including a lag of the dependent variable that is a lag of growth.



In our sample of studies the mean effect size for a study that included a measure of the initial income of each country included in the study is shown by the regression line, which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot almost all of the primary studies including a measure of the initial income lie above the regression line with only a couple of small studies falling below the regression line, which means that all of them have effect sizes far away from the mean effect size.



In our sample of studies the mean effect size for a study that included a lag of growth is shown by the regression line, which is a horizontal line to the right of the scatterplot and above 1 from the x-axis. As we can see from the above scatterplot all of the primary studies including a lag of growth with no exception at all fall well above the regression line which means that all of them have effect sizes very far away from the mean effect size.

Random Effects Model

Main results for Model 4, Random effects (MM), Z-Distribution, Fisher's Z

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-value	2-sided P-value
Intercept	0.0803	0.3515	-0.6086	0.7692	0.23	0.8192
Non-OLS: 1	-0.0501	0.4056	-0.8451	0.7448	-0.12	0.9016
OLS: 1	-0.1938	0.3705	-0.9199	0.5324	-0.52	0.6010
Endogenous: 1	-0.1159	0.1999	-0.5077	0.2759	-0.58	0.5621
Inflation: 1	0.0183	0.1443	-0.2646	0.3012	0.13	0.8991
Convergence: 1	0.1315	0.1220	-0.1077	0.3707	1.08	0.2814
Openness: 1	0.0531	0.1355	-0.2126	0.3188	0.39	0.6952
Govt. Size: 1	-0.2044	0.1291	-0.4575	0.0487	-1.58	0.1135
lagdep: 1	0.0142	0.2187	-0.4143	0.4428	0.07	0.9481
lags: 1	0.0797	0.1271	-0.1695	0.3288	0.63	0.5309
time: 1	0.0062	0.1536	-0.2949	0.3073	0.04	0.9677

Statistics for Model 4

Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero

$Q = 4.35$, $df = 10$, $p = 0.9300$

Goodness of fit: Test that unexplained variance is zero

$\text{Tau}^2 = 0.2263$, $\text{Tau} = 0.4757$, $I^2 = 98.96\%$, $Q = 9487.45$, $df = 99$, $p = 0.0000$

Comparison of Model 4 with the null model

Total between-study variance (intercept only)

$\text{Tau}^2 = 0.8281$, $\text{Tau} = 0.9100$, $I^2 = 99.84\%$, $Q = 69184.16$, $df = 109$, $p = 0.0000$

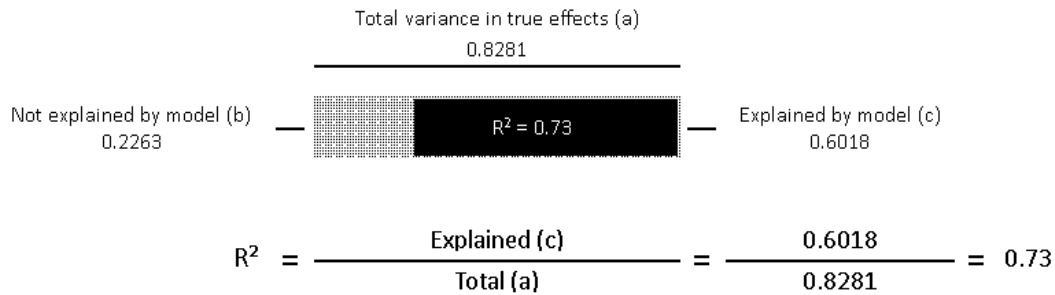
Proportion of total between-study variance explained by Model 4

R^2 analog = 0.73

Number of studies in the analysis 110

As we can observe from the above table none of the ten covariates are significant for the effect size. The test of the model tells us that the effect size does not differ by subgroup membership that is for example if a study included a measure of inflation or not is not important and so on for the rest of the covariates. The Goodness of fit test tells us that the unexplained variance of the true effects is not zero and so the true effect size varies from study to study, even within subgroups. Put another way, the model is incomplete – knowing whether a study was estimated with OLS or not for example does not allow us to completely predict its effect size and the same goes for the rest of the covariates. The I^2 statistic is 98.96%, which means that nearly all of the observed variance that remains (that is, within subgroups) reflects real differences in study effects.

R^2 for Model 4, Random effects (MM), Z-Distribution, Fisher's Z



(a) To compute the total variance (of all studies about the grand mean) we run the regression with no covariates.

(b) To compute the variance not explained by the model (of all studies about the regression line) we run the regression with the covariates.

(c) The difference between these values gives us the variance explained by the model.

As we can see from the above graph $R^2=0.73$ which means that 73% of the variance in true effects can be explained by the covariates of model 4. This means that there is only a 27% of unexplained variance by Model 4 and its covariates.

In summary, based on the R^2 values of our four models we can safely say that Model 4 is the best at explaining the variance in true effects through its set of covariates since it explains 73% of the variance and a close second is Model 1 which explains through its covariates 69% of the variance. All 4 models explain the variance in true effects far better than they do for the ALL SET sample of studies. However, the results are not significant as they were for the ALL SET sample of studies. Also, the model statistics for the four FE models indicate that all four models explain at least some of the variance in effect size but at the same time the data in all four models are not consistent with the assumptions of the fixed effect model.

5.3 Summary of Results

In this section we are going to present a summary of our results as they were derived from the previously presented tables and graphs.

Direct Effect

Here we are going to explain why there is no direct effect between democracy and growth or the effect is zero. Summarizing the meta-analysis results of our two sets the ALL SET and the BEST SET we get the following table:

Table 5

	ALL SET	BEST SET
	Point Estimate	Point Estimate
Fixed Effects	-0.009 (-10.076)	-0.506 (-172.738)
Random Effects	-0.014 (-1.377)	0.009 (0.099)
Heterogeneity Test Q-value	152683.053	69184.163

Z-values are reported in parentheses

As is obvious from the above table the heterogeneity test indicates the existence of heterogeneity in both data sets thus making the use of the Fixed Effects model statistically unsound. The Z-values of the Random Effects model for both data sets are very small making the combined effect size point estimate in both cases not statistically significant. In other words, the effect size is nullified or we cannot reject the null hypothesis which states that the combined effect size is 0.0.

Indirect Effects

Here we are going to analyze the partial existence of indirect effects between democracy and growth. Summarizing the meta-analysis results of our two sets the ALL SET and the BEST SET we get the following table:

Table 6

Moderator Variables	ALL SET	BEST SET	ALL SET	BEST SET
	Point estimate FE	Point estimate FE	Point estimate RE	Point estimate RE
Cross-section Pooled Data	0.0387 (0.54)	-0.1017 (-0.98)	-0.0346 (-0.16)	-0.0348 (-0.06)
Panel Data	0.0774 (1.08)	0.0641 (0.63)	-0.0246 (-0.11)	-0.0100 (-0.02)
NoYears	0.0012 (43.88)	0.0030 (17.45)	0.0003 (1.39)	0.0000 (0.01)
Single	-0.2917 (-3.84)	-0.3951 (-3.01)	-0.3501 (-1.57)	-0.2960 (-0.49)
Politics	0.0633 (25.18)	0.0956 (8.26)	0.0438 (2.29)	-0.0007 (-0.01)
Primary	-0.1365 (-42.13)	-0.2449 (-21.13)	-0.0211 (-1.02)	-0.0129 (-0.12)
Crossauthor	0.3616 (116.47)	0.6739 (62.75)	0.0100 (0.39)	0.0605 (0.51)
Prior	0.3599 (108.80)	0.6812 (69.05)	0.1263 (4.61)	0.0831 (0.64)
lgoog_pa	-0.3365 (-138.26)	-0.6021 (-95.98)	-0.1044 (-6.54)	-0.1281 (-1.65)
Year	-0.0103 (-32.49)	-0.0121 (-12.70)	-0.0010 (-0.60)	-0.0028 (-0.34)

Z-values are reported in parentheses

Table 6 continued

Moderator Variables	ALL SET	BEST SET	ALL SET	BEST SET
	Point estimate FE	Point estimate FE	Point estimate RE	Point estimate RE
LA	0.0231 (3.00)	0.2509 (7.16)	-0.0525 (-0.96)	0.0177 (0.04)
Africa	-0.0252 (-4.21)	-0.1522 (-4.62)	0.2950 (6.76)	0.0109 (0.03)
Asia	-0.0265 (-3.91)	0.4773 (15.09)	-0.1768 (-3.70)	0.0775 (0.22)
Developed	-0.0359 (-9.44)	-1.0659 (-51.61)	-0.0261 (-0.69)	-0.0869 (-0.30)
1970's	-0.2050 (-53.53)	-0.2876 (-21.19)	-0.1320 (-3.83)	-0.0911 (-0.34)
1980's	0.0445 (5.60)	-0.3281 (-14.23)	-0.0226 (-0.56)	0.0643 (0.25)
1990's	-0.1051 (-18.75)	-1.0512 (-73.14)	0.0908 (3.32)	-0.2086 (-1.12)
2000's	0.1549 (74.77)	0.9970 (118.07)	0.0082 (0.29)	0.1132 (0.47)
2010's	-0.1661 (-17.47)	-0.3568 (-11.49)	-0.1895 (-2.95)	-0.0789 (-0.17)
NoCountries	0.0006 (27.62)	0.0023 (17.99)	0.0004 (1.31)	0.0005 (0.23)

Z-values are reported in parentheses

Table 6 continued

Moderator Variables	ALL SET	BEST SET	ALL SET	BEST SET
	Point estimate FE	Point estimate FE	Point estimate RE	Point estimate RE
Gastil	-0.3795 (-123.13)	-1.0909 (-138.41)	0.0044 (0.20)	-0.0192 (-0.16)
Dem. Dummy	0.0455 (18.05)	-0.2686 (-26.41)	0.0119 (0.39)	0.0030 (0.02)
DemoSq	0.3380 (45.56)	1.0836 (29.08)	0.3100 (7.53)	0.4798 (1.89)
Region	-0.1389 (-73.57)	-0.6821 (-76.71)	-0.0020 (-0.09)	-0.0920 (-0.65)
Ecofreedom	0.0539 (4.98)	0.1821 (6.07)	0.1214 (2.48)	0.1018 (0.43)
Inequality	-0.1918 (-11.50)	-0.1964 (-2.03)	-0.5591 (-11.13)	-1.0791 (-2.43)
Instability	-0.1183 (-13.33)	-0.0332 (-0.54)	-0.2189 (-5.30)	0.0797 (0.23)
Population	0.0917 (41.43)	0.1310 (10.95)	0.0108 (0.52)	0.0268 (0.22)
HC	-0.0080 (-2.34)	0.4277 (33.24)	0.0376 (1.62)	0.0149 (0.12)
PC	0.0513 (16.73)	-0.2165 (-18.16)	-0.0224 (-0.94)	-0.0799 (-0.64)

Z-values are reported in parentheses

Table 6 continued

Moderator Variables	ALL SET	BEST SET	ALL SET	BEST SET
	Point estimate FE	Point estimate FE	Point estimate RE	Point estimate RE
Non-OLS	-0.2680 (-4.28)	-0.0990 (-1.10)	-0.0286 (-0.16)	-0.0501 (-0.12)
OLS	-0.2674 (-4.28)	-0.4273 (-4.81)	-0.0551 (-0.32)	-0.1938 (-0.52)
Endogenous	0.0432 (12.42)	0.0806 (6.32)	-0.1070 (-2.43)	-0.1159 (-0.58)
Inflation	0.1713 (41.36)	0.6466 (35.01)	-0.2035 (-7.00)	0.0183 (0.13)
Convergence	0.0091 (2.56)	0.2332 (18.63)	-0.0250 (-0.85)	0.1315 (1.08)
Openness	-0.4707 (-141.02)	-1.2550 (-130.75)	0.0516 (1.97)	0.0531 (0.39)
Govt. Size	0.2406 (69.80)	0.7567 (55.03)	-0.0990 (-3.97)	-0.2044 (-1.58)
lagdep	-0.0246 (-9.04)	-0.9010 (-42.38)	0.0984 (2.98)	0.0142 (0.07)
lags	0.2220 (62.47)	0.2109 (17.19)	0.0138 (0.54)	0.0797 (0.63)
time	0.0069 (2.85)	0.0171 (1.54)	0.0600 (2.58)	0.0062 (0.04)

Z-values are reported in parentheses

From the above summary table of indirect effects we can come to the conclusion that relatively robust covariates that seem to play a role in the effect that democracy has on growth even by a little are the following: Politics, Prior, lgoog_pa, Africa, Asia, 1970's, 1990's, 2010's, DemoSq, Ecofreedom, **Inequality**, Endogenous, Inflation, Openness, Govt. Size, lagdep. From all these covariates Inequality seems to be the most robust since it is significant in all the regressions with all the samples. This means that in all of the studies that tested for inequality or used inequality as a control variable the effect size of democracy on growth was always affected through this channel and always with a negative sign. The magnitude of this indirect effect is medium according to the FE models and very strong according to the RE models. The rest of the covariates mentioned above are significant in three out of four regressions making them also important in affecting the effect size of democracy on growth but not as important as Inequality. The covariates Prior, DemoSq, and Ecofreedom play a consistent positive role in the relationship of democracy to growth since their signs are always positive. The magnitude of the indirect effect through the Prior and DemoSq channels is strong to very strong whereas the magnitude of the indirect effect through the Ecofreedom channel is weak to medium. The covariates lgoog_pa, 1970's, and 2010's play a consistent negative role in the relationship of democracy to growth since their signs are always negative. The magnitude of the indirect effect through the 1970's and 2010's channels is medium to medium strong whereas the magnitude of the indirect effect through the lgoog_pa channel is medium to strong. Finally, the majority of the remaining covariates from the table are significant only in the regressions using a fixed effect model except two, Cross-section Pooled Data and Panel Data, which are not significant in any regression at all.

6. Conclusion

The aim of this paper, following in the footsteps of Doucouliagos and Ulubasoglu, was to review the accumulated evidence on the impact of democracy on economic growth in the span of the last four decades. We tried to continue the work done by Doucouliagos and Ulubasoglu by adding 35 new primary studies to 75 out of the 84 primary studies used in their meta-analysis. We applied meta-analysis and meta-regression analysis to the total pool of 110 studies with 1221 published estimates of the democracy-growth relationship and were able to draw one *firm* conclusion and another one less robust. First, we find no accumulated evidence of democracy being harmful to economic growth. Once we take all the data together the published evidence points to a zero direct effect on economic growth. This is in line with Bhagwati's (1995) prediction that democracy does not hinder development. Second, while the direct effect is found to be zero, democracy seems to have significant indirect effects on growth through various channels. In particular, we find that democracy affects growth robustly through the channels of inequality and economic freedom. As democracy increases inequality decreases (probably through some kind of redistribution of wealth by the state) causing a decrease in the economic growth. As democracy increases economic freedom also increases (probably by reducing control of the economy by the state and allowing economic actors more freedom to act in their interests) causing an increase in the economic growth. We conclude that the net effect of democracy on economic growth is negligible.

The data we collected from the 110 primary studies is enormous in size and still needs to be further analyzed. The residuals need to be used in order to eliminate several outliers before performing a meta-analysis and an MRA on the remaining data sample. Sub-samples of the studies published before and after 2000 should be tested for robustness purposes. A sample only of studies including 10 models or

more each should be tested and the largest studies should also be tested separately. Also we should check for interactions and possible curvilinear relationships among our covariates and create sets of like covariates to test their impact as a group on the effect size of our democracy-growth relationship. We should perform a subgroup meta-analysis where we are going to create independent subgroups within studies and use the subgroup as the unit of analysis in order to mitigate the problem of statistical dependence that adversely affects our confidence intervals when we use the ALL SET sample.

Only then we will be able to verify our main conclusion about the zero direct effect of democracy on growth and we will also be able to study the indirect effects more thoroughly and come to sounder and stronger final conclusions.

Finally, we should keep in mind as a last caveat that the failure to find a statistically significant p -value in meta-regression could mean that the effect (if any) is quite small, but could also mean that the analysis had poor power to detect even a large effect. One should never use a non-significant finding to conclude that a covariate (or a set of covariates) is not related to effect size.

As for any further research on the democracy-growth relationship we suggest that data is collected from a group of countries that had dictatorships or authoritarian regimes in their recent history and now they have democracy for an extended period of time. Then the countries in the time periods when they had dictatorships should be used as a control group and the same countries under democracy at different times with different degrees of democracy should be used as a treatment group and then the effect size of democracy on growth should be calculated using a traditional t-test with ANOVA or SPSS.

7. Appendix I-Glossary of Terms

Definitions/Explanations of Variables

Following are the definitions or explanations of the variables used in the different studies included in the metaanalysis as explicitly or implicitly derived from the respective authors of those studies:

Dependent Variables

1. GDP per capita growth (WDI): Annual percentage growth rate of GDP per capita based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.
2. GDP per capita growth (PWT): Real GDP using national-accounts growth rates, for studies comparing (output-based) growth rates across countries.
3. GDP per capita growth (Maddison): Real GDP per capita.
4. Avg. Annual RGDP p.c. growth (%): $(1/t) \ln (\text{RGDP p.c. terminal year} / \text{RGDP p.c. initial year}) \times 100$ where t =number of increases of RGDP p.c. in the time period in question.
5. Avg. Annual RGDP p.c. growth (%) PPP adjusted: $(1/t) \ln (\text{RGDP p.c. terminal year} / \text{RGDP p.c. initial year}) \times 100$ where t =number of increases of RGDP p.c. in the time period in question and where RGDP is PPP adjusted.

Independent/Explanatory Variables

1. GDP per capita (US\$2000): GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data is in 2000 U.S. dollars.
2. Ln GDP initial level/Ln Income p.c.: RGDP p.c. PPP adjusted. Unit: Log of per capita GDP in initial period/year dollars.
3. Democracy Variable/Level/Index: Democracy is equivalent to Polity IV's POLITY2 variable or Polity III's operational indicator of democracy.
4. Democracy Index: Gastil Index of political rights or Freedom House Index of Democracy. Unit: 7 (autocracy) to 1 (democracy).
5. Democracy Score: Institutionalized Democracy Score.
6. Democracy Dummy: Democracy dummy takes the value of 1 when there is a democratic system in a country in a given year and zero otherwise.
7. Autocracy Score: Institutionalized Autocracy Score.
8. Xrcomp: Competitiveness of Executive Recruitment.
9. Pcomp: Competitiveness of Political Participation.
10. Xropen: Openness of Executive Recruitment.
11. Xconst: Executive Constraints.
12. Political Constraint: POLCONV is an index ranging from 0 (no constraints on executive's powers) to 1 (full constraints on executive's powers).

13. Transition/interregnum: Transitions/interregnums is a binary variable coded 1 if Polity IV's POLITY2 is either -77 or -88, numerical codes used to represent transition or interregnum periods; and 0 otherwise.
14. Democracy duration: Duration of democracy is the number of consecutive years for which POLITY2 is greater than zero.
15. STARTDEMOC: It is the indicator of initial democratic capital. It is a dummy variable capturing the initial level of democracy (that is, the level of democracy in 1972).
16. STARTPOL: It captures every country's initial level of Gastil political rights (that is, in 1972).
17. REGTYPE: It is a proxy for regime type. It is the average level of political rights, that is, the mean of the Gastil political rights series for the 1970s and 1980s.
18. Q_REGTYPE: It is a quadratic specification of REGTYPE, aimed to capture nonlinearity effects in the relationship between growth and regime type.
19. Foreign direct investment (% of GDP):
20. Inflation Rate: Annual rate of change in CPI. Unit: %.
21. Terms of trade change (%): The terms of trade change is computed based on the annual percentage change in the net barter terms of trade index created by the World Bank.
22. Terms of trade (%): Growth rate over each period of the ratio of export to import prices.
23. Terms of trade shocks (%): Growth rate of export prices minus growth rate of import prices.
24. Ln Life expectancy: The log of life expectancy at birth at the start of each period (as an indicator of health status).

25. Government/Public consumption (% of GDP): Government Final Consumption/GDP X 100(usually excluding education and defense spending). Share of government consumption of goods and services in GDP, excluding transfers and public investment.
26. Trade openness/share (%): Trade openness is measured by the sum of merchandise exports and imports divided by GDP X 100.
27. Oil and gas production (% of GDP): Oil and gas production (% of GDP) is an approximate measure of the value of oil and gas production (US\$2000) divided by GDP (US\$2000) and taken from Ross's (2013) oil and gas dataset.
28. Oil Prices: World Oil Prices.
29. Oil Exporter: Takes value 1 if country is oil exporter. Unit: Dummy variable.
30. Political violence: Political violence is the index of societal and interstate violence (ACTOTAL) from the Major Episodes of Political Violence (MEPV), which is the sum of societal and interstate violence scores in a country-year. This index ranges from 0 to 10, with a higher value indicating a greater degree of political violence.
31. Political Instability: Number of revolutions and coups per year.
32. INSTABILITY: It is a proxy for sociopolitical instability. Due to the practical difficulty of exactly assessing instability, the standard deviation of the Gastil political rights series is used.
33. Former British colony: Dummy Variable equal to 1 if country was a British colony before its independence and 0 otherwise.
34. Former French colony: Dummy Variable equal to 1 if country was a French colony before its independence and 0 otherwise.
35. Ever a colony: Takes value 1 if the country was ever a colony since 1776. Unit: Dummy variable.

36. Ethnolinguistic fractionalization: Probability that two randomly selected persons from a given country will not belong to the same ethnolinguistic group. Unit: Probability.
37. Landlock: Landlock is a binary variable coded 1 if a given country is landlocked; and 0 otherwise. Unit: Dummy variable.
38. Tropical: Tropics captures the approximate percentage of a given country's land area in geographical tropics and derives from Gallup et al.'s (1999) dataset, while its coverage was expanded by manually imputing values for Comoros, Cape Verde, and Mauritius.
39. Aid/GNI (%): Aid/GNI refers to the fraction of net ODA in GNI (%) and is taken from the WDI.
40. Population/Ln Fertility Rate: Population Growth Rate of total population.
41. Population under 15: Percent of population 15 and under. Unit: %.
42. Population over 65: Percent of population 65 and over. Unit: %.
43. Human Capital: Secondary school enrollment rate.
44. Human Capital: Average years of secondary and higher education in the population over age 25.
45. Male Schooling: Male average years of attainment in secondary and higher schools for the adult population at the start of each period.
46. Female Schooling: Female average years of attainment in secondary and higher schools for the adult population at the start of each period.
47. Ln (GDP)*human capital: An interaction between the log of initial GDP and an overall human capital variable. Overall human capital is the sum of the levels of male and female school attainment and the log of life expectancy, where each variable is multiplied by its coefficient in the regression.
48. Public educational spending ratio: The ratio of public educational spending to GDP.

49. SGCREDIT: The standard deviation of the growth of domestic credit.
50. Black Market Premium: Difference between black market exchange rate and official exchange rate, divided by the official rate. Unit: %
51. Rule of Law Index: The rule-of-law index (measured on a 0 to 6 scale, with 6 the most favorable) is one of several subjective country indexes prepared for fee-paying international investors by International Country Risk Guide.
52. Investment Ratio/Rate: The period-average investment ratio. Rate of physical capital investment. Unit: % GDP.
53. Income Inequality: Gini coefficient. Unit: (%).
54. Muslim: Takes value 1 if majoritarian religion is Muslim. Unit: Dummy variables taking the values 0 or 1.
55. Catholic: Takes value 1 if majoritarian religion is Catholicism. Unit: Dummy variables taking the values 0 or 1.
56. Other Christian: Takes value 1 if majoritarian religion is Christian, but not Catholicism. Unit: Dummy variables taking the values 0 or 1.
57. Confucian: Takes value 1 if majoritarian religion is Buddhism, Xintoism, Confucianism, etc. (excludes Hindu). Unit: Dummy variables taking the values 0 or 1.
58. War casualties: War casualties per capita. Unit: Ratio.
59. Postwar Independence: Takes value 1 if country gained independence after the Second World War. Unit: Dummy variable.
60. Log area: Area. Unit: Logarithm of area in square kilometers.

61. Log distance: Average distance to the capitals to the world's 20 major exporters, weighted by the volume of bilateral imports. Unit: Thousands of kilometers.
62. ECONFREE: It is a 1-to-10 index scale. A score of 1 indicates the lowest average level of economic freedom and a score of 10 the highest level, in the sample period.
63. Q_ECONFREE: It is a quadratic specification of ECONFREE, aimed to capture nonlinearity effects in the relationship between growth and economic freedom.
64. LOWHUMCAP: Low-level human capital is the percentage of the total population that achieved basic schooling.
65. HIGHHUMCAP: High-level human capital is the percentage of the total population that achieved higher schooling (formal education at college level and beyond).
66. SUB-SAHAFRICA: Sub-Saharan Africa Dummy.
67. LATAMERICA-CARIB: Latin America and the Caribbean Dummy.
68. NTHAFRICA-MIDEAST: North Africa and the Middle East Dummy.
69. ASIA-PACIFIC: Asia and the Pacific region Dummy.
70. NTHAMERICA-EUROPE: North America and Europe Dummy, where most OECD countries are located.
71. Market: It is a random variable that ranges between the values 1-3 from non-market to free market economy.
72. Development: It is measured by the level of PQLI as an indicator of economic well-being.
73. Culture: Dummy variable taking the value of 1 for cultural tradition tolerant of diversity, conflict, and compromise and 0 for cultural tradition conducive to hierarchical relationships and extreme reference to authority.

74. Education: It measures educational expenditure as a percentage of total public expenditure.
75. LAW: Reflects the degree to which the citizens of a country are willing to accept the established institutions to make and implement laws and adjudicate disputes. It also measures the extent to which countries have sound political institutions, strong courts, and orderly succession of powers.
76. REPUDCON: Measures the risk of a modification in a contract taking the form of repudiation, postponement, or scaling down because of budget cutbacks, indigenization pressure, a change in government, or a change in government economic and social priorities.
77. EXPRISK: Measures the risks associated with outright confiscation and forced nationalization of private property.
78. BURQUALIT: Reflects the competency and the professionalism of government bureaucrats and the government employees who are recruited and promoted by merit rather than political loyalty. It measures autonomy from political pressure, strength, and expertise to govern without drastic changes in policy or interruptions in government services.
79. BURDEL: Measures the efficiency and the quality of government bureaucracy.
80. CORRUPTION: Measures the extent to which high government officials are likely to demand special payments.
81. CONENF: Measures the extent to which contracts are enforced and claims are legally adjudicated.
82. INFQUAL: Measures the quality of infrastructure.
83. NATRISK: Measures the risk of forced nationalization of private property.
84. Property rights index: A rating of property rights in each country (on a scale from 1 to 5).

- 85. Business regulation index: a rating of regulation policies related to opening a business and keeping open a business (on a scale from 1 to 5).
- 86. Legal origin: identifies the legal origin of the Company Law or Commercial Code of each country.
- 87. Religion: identifies the percentage of the population of each country that belonged to the three most widespread religions in the world in 1980.
- 88. Latitude: the absolute value of the latitude of the country, scaled to take values between 0 and 1.

8. Appendix II-Technical Appendix

In this technical appendix we are going to describe the reporting protocols used in the research and analysis process that led to the writing of this paper. These reporting protocols are based on the recommendations of the Meta-Analysis of Economics Research Network (MAER-Net).

Research Question and Effect Size

The question that prompted this research was if there is a relationship between democracy and economic growth, which is conclusive, based on the published literature up to now.

In order to answer this question we decided to use the partial correlation of democracy (the independent variable of interest from the original primary study regressions) on growth (the dependent variable of interest from the original primary study regressions) as the measure for the effect size to be tested. The partial correlation coefficients are calculated by using the t -statistics reported in the primary studies. Where t -statistics are not reported, they can be approximated from the reported levels of statistical significance, or from the reported regression coefficients and standard errors. The formula used to calculate partial correlations is: $t/\sqrt{(t^2+df)}$ where t is the t -statistic and df is degrees of freedom. Where degrees of freedom were not reported they were calculated using the formula: $df=n-k-1$ where n is the number of observations included in the regression and k the number of variables. Note that this calculation for the partial correlation will always produce a positive number, so it is necessary to convert it to a negative number if the regression coefficient is negative (see Greene 2000, chapter 6). What we did was to convert the t -value when it was reported as an absolute value into a signed value based on the sign of the regression coefficient and then calculate the correlation using the above formula. For a detailed analysis of the calculations see the excel file named “metaanalysis data”. It is important that a

standardized measure of an effect is used. In our case we entered the effect sizes of our primary studies in the CMA⁸⁵ software which proceeded in transforming them to a Fisher's Z score and then back to a partial correlation for programming reasons. The effects were standardized automatically in the software when the data was entered by the use of the following formula: $\varepsilon = \sum [N_i \varepsilon_i] / \sum N_i$ where ε is the standardized effect, ε_i is the effect size in our case partial correlation from the i^{th} study that was introduced in the software and transformed into a Fisher's Z score and N is the associated weight. For the random effects model the associated weight was the inverse of the total variance for each study, which is the sum of its variance with the between-studies variance. For the fixed effects model the associated weight was the sample size of each study.

Research Literature Searching, Compilation and Coding

The search for the literature was done in Google Scholar and in Google Search engine and also in the following databases through the portal of the University of Macedonia's library: Science Direct, ABI/Inform Collection-ProQuest, Wiley Interscience, JSTOR, EBSCOhost, and MPSA. The precise combination of keywords employed for the search was: "Democracy and Growth" and "Democracy and Economic Growth" both in quotes and without quotes. The search started in the spring of 2017 around March and ended in the summer of 2018 around August.

Meta-analysis requires the identification of primary studies and the coding of information from them. Therefore, a comprehensive search of relevant databases, analysis of citations and careful study of references in order to identify as many studies as possible was done. The rules for study inclusion were the following: 1) All studies of the Doucouliagos-Ulubasoglu collection that were available, 2) All studies having as their primary focus the investigation of the democracy-growth relationship, 3) From

those studies only the ones that used econometric methodologies to analyze their empirical findings and reported them, 4) The next step in narrowing the sample of studies was to include only those that had economic growth as a dependent variable and democracy as one of the independent variables, and 5) Only those studies that were published in a scientific-social journal or were presented in a public forum like the U.N.

Following the above rules of inclusion we included 110 studies out of 169 that were thoroughly examined. Most of the 59 studies that were excluded violated either the second or the third rule of inclusion or both while the rest violated one of the other rules. A thorough list with descriptions of the 110 studies included in our meta-analysis is available in Table 1 in the Literature Review section of our paper. Also a complete list of the information coded for each study in the form of binary and continuous covariates along with detailed descriptions is available in Table 2 in the Data Analysis section of our paper.

The author of this paper, Kyriakos J. Xafis, is the only researcher who searched, read, and coded the research literature and is solely responsible for any mistakes herein. The MAER-Net protocol of using at least two reviewers to code the research literature was not followed because this work was done as part of a Master's Thesis preparation.

MRA Modeling Issues

The meta-regression model (known as MRA) has been developed to analyze the multi-dimensional nature of the research process (Stanley and Jarrell 1998). The impact of specification, data and methodological differences can be investigated by estimating an MRA of the following (linear) form:

$$\varepsilon_i = \alpha + \gamma_1 X_{i1} + \dots + \gamma_k X_{ik} + \delta_1 K_{i1} + \dots + \delta_n K_{in} + u_i \quad (1)$$

where ε_i is the standardized effect derived from the i^{th} study (in our study we use the partial correlation), α is the constant term, X_j are dummy variables representing characteristics associated with the i^{th} study, K_j are continuous variables associated with the i^{th} study, γ and δ are the unknown regression coefficients, and u_i is the disturbance term, with usual Gaussian error properties.

Equation (1) is a fixed effects model MRA and assumes that variation in ε_i can be explained by sampling error and *systematic* differences between studies (the X and K study characteristics variables).

The random effects version of the MRA is given by:

$$\varepsilon_i = \alpha + \gamma_1 X_{i1} + \dots + \gamma_k X_{ik} + \delta_1 K_{i1} + \dots + \delta_n K_{in} + u_i + e_i \quad (2)$$

Equation (2) assumes that in addition to sampling error, the source of some of the variation in ε_i is due to *random* differences among studies that cannot be identified. The regression coefficients in (1) and (2) quantify the impact of specification, data and methodological differences on reported study effects (ε_i).

It is recommended that both fixed effects and random effects models be estimated (see Hunter and Schmidt 2004) and we do so for two different study samples the ALL SET and the BEST SET.

Funnel graphs and scatterplots are used to present the analysis of our data sets. The funnel plot is a scatter of the standardized effects and a measure of precision (sample size or standard errors). The funnel plot offers three important pieces of information. (a) The more symmetrical the plot the more representative is the observed distribution of findings and confidence with descriptive statistics is increased. (b) The funnel plot shows the degree to which empirical results converge towards one underlying population effect and the extent to which the literature has reported heterogeneous findings. (c) The center of a symmetrical funnel plot is an unbiased estimate of the underlying population effect. Arranging the estimates in a chronological order or by sample size and plotting these in a forest plot informs on whether the findings are stable over time and whether structural breaks have occurred or

whether the findings depend on sample size or not. Forest plots were estimated and are described but not presented in our paper due to the big number of studies included in our data sets, which makes it difficult if not impossible to show the forest plots without messing up the scales. A thorough investigation of publication bias was done for both data sets fully described in the results section of the current paper.

It is a good idea to check the sensitivity and robustness of the MRA. Examples of such testing include: (a) comparison of fixed effects and random effects models; (b) removing the largest and smallest estimates; (c) using only those studies that the analysts regard as superior according to some criterion (e.g. published in leading journals or used a particular estimation procedure). In our analysis we performed a comparison of fixed and random effects models. Four FE models and four RE models were estimated for the two data sets with different combinations of the 40 covariates used in total in our analysis. The weaknesses of our analysis and suggestions for further analysis of our data are fully disclosed in the conclusion of this paper.

Descriptive statistics were calculated for all studies but were not reported in our paper for saving space. All calculations, results, tables, graphs, and formulas are available in the files ALL SET.cma, BEST SET.cma, ALL SET.cmr, and BEST SET.cmr. All of the techniques listed in this technical appendix can be performed with *CMA*. Other options include *Metawin* and *Stata*. However, if one wishes to verify our results and reproduce our analysis without starting from the beginning he should use the *Comprehensive Meta-analysis* version 3 software package that we used.

9. Notes

1. “Democracy and Economic Growth: A Meta-Analysis” American Journal of Political Science, Vol. 52, No. 1, January 2008, Pp. 61–83
2. Useful reviews of the empirical literature can be found in Alesina and Perotti (1994), Aron (2000), Przeworski and Limongi (1993), and Sirowy and Inkeles (1990). Summaries of the theoretical debates can be found in Baumand Lake (2003), deHaan and Siermann (1995a), Gasiorowski (2000), Kurzman, Werum, and Burkhart (2002), and Quinn and Woolley (2001), among others.
3. Partial correlations are changed into Fisher’s Z scores for technical reasons of the CMA software in order to perform the MRA and they are reported as such in the MRA results section of this paper.
4. This correction becomes perfect as the number of studies approaches infinity.
5. Traditional qualitative reviews cannot filter such effects, which are subject to “methodological speculation” (Stanley 2001).
6. Less Developed Countries
7. Foreign Direct Investment
8. Sub-Saharan Africa
9. Pooled Ordinary Least Squares
10. Random Effects-Generalized Least Squares
11. Fixed Effects-Ordinary Least Squares
12. Gross Domestic Product per capita
13. World Development Index
14. Penn World Table
15. Ethnolinguistic Fractionalization

16. Gross National Income
17. Middle East North Africa
18. Generalized Method of Moments
19. Average
20. Real Gross Domestic Product
21. National Gross Domestic Product
22. Instrumental Variables
23. Three Stage Least Squares
24. Structural Equation Modeling
25. Seemingly Unrelated Regressions
26. Purchasing Power Parity
27. Autoregressive Model
28. Probability
29. Hahn-Hausman-Kuersteiner
30. Total Factor Productivity
31. Association of Southeast Asian Nations
32. Simulated Generalized Method of Moments
33. Non-Corruption Index
34. Global Financial Crisis
35. Weighted Least Squares
36. Standard Deviation
37. Maximum Likelihood Estimation

- 38. Augmented Dicky Fuller
- 39. Autoregressive-Distributed Lag
- 40. Error Correction Model
- 41. Vector Error Correction Model
- 42. Fully Modified Ordinary Least Squares
- 43. Dynamic Ordinary Least Squares
- 44. Freedom House
- 45. Anderson-Hsiao
- 46. Commonwealth of Independent States
- 47. Democracy
- 48. Support Vector Machines Democracy Index
- 49. Gross National Product
- 50. Robust Regression
- 51. Intelligence Quotient
- 52. Central and Eastern European
- 53. Former Soviet Union
- 54. Thousands
- 55. Year
- 56. Two Stage Least Squares
- 57. International Country Risk Guide
- 58. Business Environment Risk Intelligence
- 59. Central Francophone Africa

60. Estimated Generalized Least Squares
61. Human Development Index
62. Physical Quality of Life Index
63. Cross-section
64. Time Series Cross-section
65. Cumulative Distribution Function
66. Latin America
67. Rainfall
68. Capital Flows
69. Other Capital Flows
70. Terms of Trade
71. Disparity Reduction Rate
72. Franc-Zone Africa
73. Gross Fixed Capital Formation
74. Economic Turmoil in Media Index
75. Nonviolent and Violent Campaigns and Outcomes
76. Partial correlations can be calculated directly from regression output. See Greene (2000, 234) for details. Different factors are held constant in different studies, contributing to the heterogeneity of the results. We control for this through meta-regression analysis.
77. The scale is in Fisher Z score units and not in partial correlation units.
78. The tendency in the early literature to provide detailed country compositions has been abandoned in recent years, resulting in loss of data points in the MRA.

79. Note that the variable Region indicates whether researchers include a regional dummy in their regressions or not, while the variables Latin America, Asia, and Africa mentioned above indicate whether the samples of the studies include countries from those continents (regardless of whether a regional dummy is used in the regressions or not).
80. This information can be collected from footnotes in the original studies.
81. Binary Variable.
82. By “constructed” studies here we refer to the 1221 data points in the MRA, which we consider as statistically independent studies for our purposes although we know that they are not.
83. The publication bias analysis is done only for the fixed effects model since this is the model of interest for the ALL SET and since the analysis for the random effects model is for the most part similar.
84. By subgroup membership we mean the value of 1 or 0 that each study takes for each one of the categorical covariates or the magnitude of the number value that each study takes for each one of the continuous covariates.
85. Comprehensive Meta-analysis software package.

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