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THE NEW INSIGHTS ON THE RELATIONSHIP BETWEEN DEMOCRACY AND INCOME: EMPIRICAL EVIDENCE FROM ADVANCED ECONOMIES[1]

DEMOKRASİ VE GELİR ARASINDAKİ İLİŞKİ ÜZERİNE YENİ GÖRÜŞLER: GELİŞMİŞ EKONOMİLERDEN AMPİRİK BULGULAR

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Abstract
This paper replicates the data set of Acemoglu et al. (2008) to investigate the relationship between the level of income and the degree of democracy in terms of advanced economies over the period 1960-2000. The study extends the initial findings of Acemoglu et al. (2008) in terms of econometric procedures by using the system-GMM and allowing for more flexible – non-linear – specifications for the effect of income on democracy. The empirical results provide evidence of positive and non-linear effect from income to democracy for advanced economies even after controlling for country-specific effects. In addition, with the same data set that of Acemoglu et al. (2008), we find that the coefficients of log GDP per capita are positive and statistically significant in most specifications by way of using the system-GMM method, in contrast to the results provided by Acemoglu et al. (2008). Furthermore, an interesting result is the square term of log GDP per capita which is negative and statistically significant. This outcome indicates that while the initial stages of an increase in log GDP per capita have a positive impact on democracy, the latter stages show that this positive correlation turns into a negative possibly due to the changing dynamics of the power of income segments in the society.

Keywords: Democracy, Income, Difference-GMM, System-GMM, Non-Linear Specification
JEL Classification Codes: E00, C1, O11

Öz
Bu makale, Acemoglu vd. (2008)'nin veri setini kullanarak gelir seviyesi ve demokrasi düzeyi arasındaki ilişkiyi 1960-2000 dönemi için gelişmiş ülkeler açısından araştırmaktadır. Çalışma Acemoglu vd. (2008)'nin önsel çıkarımlarını sistem-GMM ve gelirin demokrasi üzerindeki etkisi adına esnek – doğrusal olmayan – spesifikasyon kullanımına olanak sağlayarak ekonometrik yöntemler açısından genişletmektedir. Ampirik sonuçlar, ülkeye-özgü etkilerin hesaba katıldığı durumlarda bile, gelişmiş ekonomiler için gelirden demokrasiye doğru pozitif ve doğrusal olmayan bir etkinin varlığına dair çıktılar sunmaktadır. Ayrıca Acemoglu vd. (2008) tarafından kullanılan aynı veri seti çerçevesinde, Acemoglu vd. (2008)'nin sonuçlarına karşıt olarak, kişi başına gelirin logaritmik katsayısının sistem-GMM yöntemi kullanımı aracılığıyla çoğu spesifikasyon için pozitif ve istatistiksel olarak anlamlı çıktığına ulaşılmıştır. Buna ek olarak, ilgi çekici sonuç kişi başına gelirin logaritmik katsayı karesinin negatif ve istatistiksel olarak anlamlı çıkmasıdır. Bu çıktı kişi başına düşen GSYH'deki artışın ilk aşamalarının demokrasi üzerinde olumlu bir etkisi olmasına karşın, toplumdaki gelir bölüşümündeki gücün değişen dinamiklerine büyük oranda bağlı olarak ileri aşamalarında negatif bir duruma dönüştüğünü göstermektedir.

Anahtar Kelimeler: Demokrasi, Gelir, Fark-GMM, Sistem-GMM, Doğrusal-Olmayan Spesifikasyon
JEL Sınıflandırması: E00, C1, O11

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INTRODUCTION

The investigation of democracy-income nexus is still one of the major subjects in political economy. The traditional wisdom shows that there is a strong correlation between income per capita and the level of democracy across countries, especially in advanced economies. This notable empirical regularity is so-called the "modernization theory", which is theorized by Lipset (1959)[3]. Following the "modernization theory", many studies have found that the positive linkage between income per capita and the degree of democracy is prevailing through different countries (Barro, 1997, 1999; Papaioannou and Siourounis, 2008; Gundlach and Paldam, 2009; Corvalan, 2010; Boix, 2011). However, reviewing the existing studies have also revealed that the causal linkage between these two variables is challenging, since both democracy and income can be affected by other factors from politics, social regime and economy alike, which of those could have unobserved characteristics (i.e. the omitted variables problems) and could be affected by reverse causality running from democracy to income (Che et al. 2013: 159). In their famous paper, Acemoglu et al. (2008) specify that the empirical foundations of this positive correlation between democracy and income are spurious. They indicate that the correlation between democracy and income disappears when accounting for the country and time-fixed effects using a wide array of countries from different regions. According to Acemoglu et al. (2008), the major reason for this uncorrelated feature of these two variables depends on the fact that societies embarked on divergent political-economic development paths at certain critical junctures. In other words, both democracy and income have their own specific characteristics influencing from the changes in institutional structures and historical events[4].

The empirical finding in Acemoglu et al. (2008) has been criticized by recent studies which of those refer different econometric methods to validate the positive correlation between democracy and income. Gundlach and Paldam (2009), for instance, find that the positive correlation running from income to democracy is prevalent and significant by the presence of instrumentation strategy subject to the prehistoric factors. Benhabib et al. (2011) also benefit from non-linear Tobit-type approaches to reveal the democracy-income nexus. In addition, Heid et al. (2012) put account alternative estimation procedure and thus obtain a significant result in favor of the "modernization theory". While all these different types of estimation techniques are used to support the Lipset hypothesis, Acemoglu et al. (2008) employ an unfamiliar estimator so-called the dynamic panel estimator produced by Arellano and Bond (1991) to allow for the presence of high persistence of democracy and income. In addition, Acemoglu et al. (2008) use fixed effects estimator to account for time-invariant unobserved factors.

The simplest form of empirical background provided by Acemoglu et al. (2008) depends, in essence, the inclusion of the lagged value of democracy into their estimations due to the presence of high degree of persistence of democracy over time. However, since the difference of the lagged value of democracy is correlated with the difference of the error term in their fixed effects analysis, the specifications lead to biased results for the effect of income per capita. Therefore, Acemoglu et al. (2008) utilize the difference-GMM estimation method provided by Arellano and Bond (1991) to eliminate the biased estimation problem. By accounting this estimation method, the difference of lagged values of democracy is instrumented by additional lagged values of democracy. Although the use of all lags of democracy allows for the biased estimation problem, only the small percentage of difference

[3] Therefore, it is also known as the Lipset hypothesis in the literature.

[4] In comparative-historical analysis, this is also called as the "critical junctures". For more information, please see Capoccia (2016).

of the lagged democracy is explained due to the fact that there is a high persistence of democracy over time. This further issue is known as a weak instrument problem[5]. Therefore, to address this further problem and thus to circumvent finite sample bias, the system-GMM estimation method developed by Arellano and Bover (1995) and Blundell and Bond (1998) is used in the empirical part. Table 1 shows the initial simulation results for AR(1) model where the system-GMM estimation dominates the difference-GMM estimation as the Bond (2002) reveals out this case. In particular, the difference-GMM estimate of α is 0.4844 when the true value is 0.8 and the *N* is 100, whereas the corresponding system-GMM estimate is 0.8101. Similarly, the difference-GMM estimate of α is 0.7386 when the true value is 0.8 and the *N* is 500, whereas the corresponding system-GMM estimate is 0.7939.

Table 1: Simulation Results

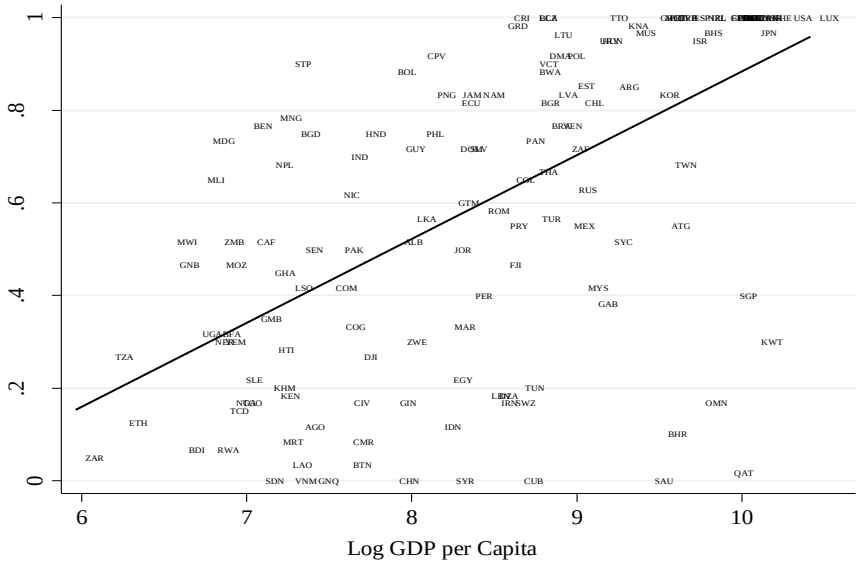
N	α	Fixed effects (Within groups) (1)	Difference GMM (2)	System GMM (3)
100	0.5	-0.0370	0.4641	0.5100
		(0.0697)	(0.2674)	(0.1330)
	0.8	0.1343	0.4844	0.8101
		(0.0726)	(0.8224)	(0.1618)
	0.9	0.1906	0.2264	0.9405
		(0.0725)	(0.8264)	(0.1564)
500	0.5	-0.0360	0.4887	0.5021
		(0.0310)	(0.1172)	(0.0632)
	0.8	0.1364	0.7386	0.7939
		(0.0328)	(0.3085)	(0.0779)
	0.9	0.1930	0.5978	0.9043
		(0.0330)	(0.6407)	(0.0999)

Notes: Table 1 is copied from Bond (2002). α is the true persistent rate. N is the number of panel units in the panel data. The standard errors are in parentheses.

The positive cross-country relationship between income per capita and the degree of democracy for all countries, including both high-, medium- and low-income, in the 1990s, is presented in Figure 1, which shows the association between the Freedom House measure of democracy and log income per capita in 1990s[6]. Barro (1999: 160) clearly explains this positive correlation by the following sentence: "…increases in various measures of the standard of living forecast a gradual rise in democracy. In contrast, democracies that arise without prior economic development …tend not to last".

[5] For a detailed information about the weak instrument problem, please see Stock and Wright, 2000; Stock et al. 2002; Greene, 2003.

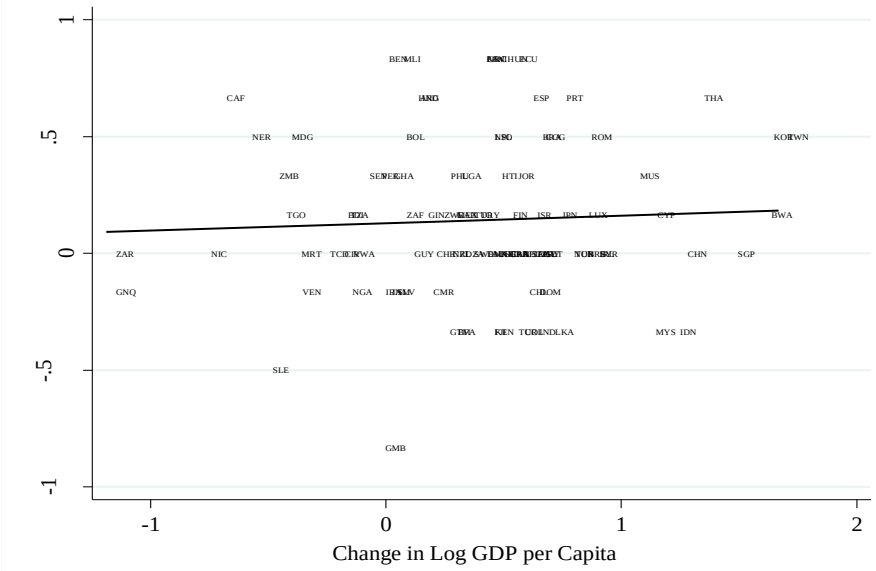
[6] Similar to the study of Acemoglu et al. (2008), all figures exert the three-letter World Bank country codes to describe countries from developed region, which are provided in Appendix Table A2.



Notes: See Appendix Table A1 for data descriptions and sources. Values are averaged of the 1990s by country.

Figure 1: Democracy and Income, 1990s

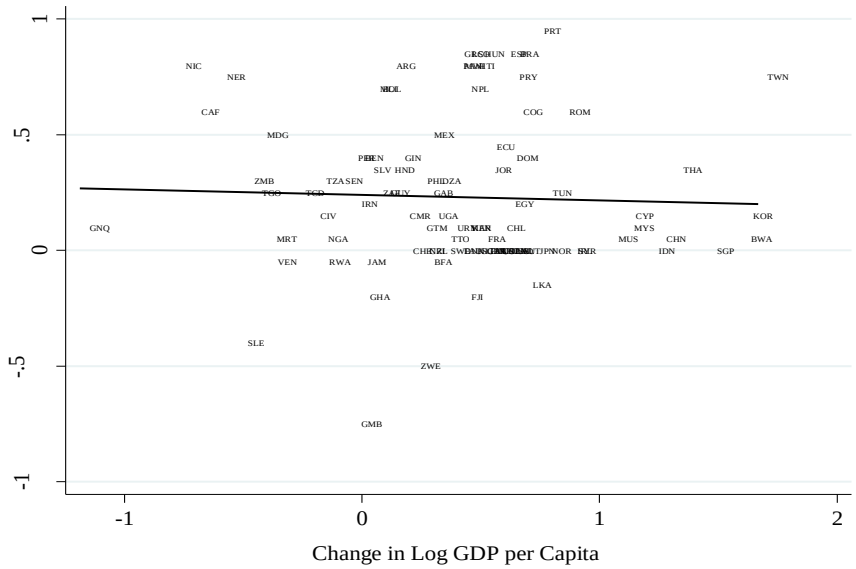
In addition, Figure 2 and Figure 3 depict the changes in democracy and income. The democracy indices are collected from two different sources which are Freedom House and Polity IV for each country between 1970 and 1995 against the change in income per capita. Both of these figures show that the changes in income per capita and changes in democracy have not any causal linkages[7].



Notes: See Appendix Table A1 for data descriptions and sources. Changes are the total difference between 1970 and 1995. The independence of a sample country by 1970 determines the inclusion in the figure. Start and end dates are chosen to maximize the dimension of the cross-section.

Figure 2: Change in Democracy and Income, 1970-1995

[7] Please keep in mind that all these figures are retrieved from the data set of Acemoglu et al. (2008).



Notes: See Appendix Table A1 for data descriptions and sources. Changes are the total difference between 1970 and 1995. The independence of a sample country by 1970 determines the inclusion in the figure. Start and end dates are chosen to maximize the dimension of the cross-section.

Figure 3: Change in Democracy and Income, 1970-1995

Whereas all these figures employ the whole country sets, it is clear that the advanced economies are clustered in the upper segments of the line. Therefore, it indicates that there is a highly positive correlation between the degree of democracy and the log GDP per capita, especially in terms of advanced economies.

In that sense, this study revisits the democracy-income nexus proposed by Acemoglu et al. (2008) for advanced economies over the period 1960-2000. Based on the same assumptions, hypotheses, estimation procedures, and data as that of Acemoglu et al. (2008), we focus on more specific classification for the countries which are collected from the advanced region. Though the estimation results provided by Acemoglu et al. (2008) for various countries covering both developed, developing and underdeveloped show that there is no causal relationship between income per capita and the degree of democracy, we find that this linkage turns into positive and become significant in the case of advanced economies. To test this relationship, we use two different components of democracy and employ various econometric methods, subsamples, time periods and non-linear specifications. Therefore, the empirical outputs are not homogeneous in contrast to the results of Acemoglu et al. (2008). In particular, the empirical outcomes for the effect of income on democracy are heterogeneous, which indicate that the high-income countries benefit more from a higher degree of democracy in line with an increase in income over time. In other words, income follows democracy in advanced economies. This finding is robust to different estimation specifications, econometric procedures and time periods. In other words, employing the smaller portion of countries selected from the advanced region with up to 61 countries used by Acemoglu et al. (2008), we find positive and statistically significant results for the relationship between democracy and income.

The paper proceeds as follows. In the following part, we describe the data. Then we present the econometric models and some identification assumptions used in Acemoglu et al. (2008). Following the details on econometric models, the other part contains the empirical results for the 1960-2000 period ranging from annual to twenty-year. In addition, this part

extends testing on the causal linkages between democracy and income by using non-linear – flexible– specifications. The last part concludes.

DATA

The data set used in this study is completely the same as that organized by Acemoglu et al. (2008)[8]. The primary measure of democracy is the Freedom House Political Rights Index which is also supplemented by Bollen (1990, 2001)'s data. The components of this first type of democracy measure are based on several questions including the factors as follows: (i) the election structure (free and fair or not); (ii) the role of power in social segmentation; (iii) the role of minority groups; (iv) the competition level among different political groups and parties; and (v) the role of government. Similar to Barro (1999), the democracy indices were also normalized between zero and one [0, 1], with one indicating the most democratic set of institutions.

As a robustness check, we also approach the other widely used measure of democracy as a proxy variable in the econometric analysis, which is collected from the Polity IV database of individual country regime trends. This latter measure of democracy is measured by the difference between democracy and autocracy indices and thus is called as the composite Polity index. It is ranged between the scores of zero and ten; however, to facilitate the comparison with the former measure of democracy, we also transform this latter data to lie between zero and one [0, 1]. Similarly, one corresponds to a higher degree of democracy. Both the Polity Democracy Index and the Polity Autocracy Index are based on the factors including the competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment, and the constraints on the chief executive.

Using both normalized democracy indices, we construct annual, five-year, ten-year, and twenty-year panels for advanced economies. Similar to Acemoglu et al. (2008), we take the observation fifth year to conduct the five-year panels. Following this method instead of averaging the five-year data provides us to eliminate an additional serial correlation problem and to get rid of the statistical inference issue. The same procedure is also used for the ten-year and twenty-year panels[9].

Information about the GDP per capita (in PPP) obtains from the Penn World Tables 6.1 provided by Heston et al. (2002) for the post-war period. Moreover, the other variables we use in the econometric analysis as a robustness check are discussed in Appendix Table A1, in which the details of the data definitions and sources are given.

Table 2 presents the descriptive statistics for the main variables. The sample period is 1960-2000 and each observation corresponds to five-year intervals. In contrast to Acemoglu et al. (2008), the table shows the details of these statistics for only the high-income countries, or so-called the advanced economies. In each case, we report means, standard deviations, the total number of countries, skewness, kurtosis, and Jarque-Bera. The initial overlook to the statistics shows that the degree of democracy is high for the sample advanced economies, which of those tend to be more democratic in case of a set of institutions.

[8] This same data set can be downloaded from the American Economic Review web site.

[9] Acemoglu et al. (2008: 814) notes that "For the Freedom House data, which begin in 1972, we follow Barro (1999) and assign the 1972 score to 1970 for the purpose of the five-year and ten-year regressions".

Table 2: Descriptive Statistics

	Freedom House Measure of Democracy	Polity Measure of Democracy	Log GDP per capita (chain-weighted 1996 prices)	Log Population	Median Age	Education
Mean	0.751	0.721	9.207	8.221	29.164	7.082
Median	1	1	9.278	8.428	29.7	7.3
Maximum	1	1	10.692	12.550	41.3	12.179
Minimum	0	0	7.110	3.466	14.7	1.37
Std. Dev.	0.347	0.392	0.634	2.054	5.948	2.191
Variance	0.121	0.154	0.403	4.221	35.375	4.799
Skewness	-1.030	-0.921	-0.652	-0.333	-0.371	-0.212
Kurtosis	2.397	2.009	3.200	2.474	2.174	2.714
Jarque-Bera	11.709	11.119	4.331	1.820	3.123	0.653
Observations	493	441	408	506	561	305
Countries	61	61	61	61	61	61

ECONOMETRIC MODEL

The basis of the econometric model will consider the following dynamic panel model to examine the democracy-income nexus, which is replicated the same methodological structure provided by Acemoglu et al. (2008), as in Equation (1):

$$d_{it} = \alpha d_{it-1} + \gamma y_{it-1} + X'_{it-1}\beta + \mu_t + \delta_i + u_{it} \quad (1)$$

where d_{it} is the democracy level of country i (i = 1, …, N) in period t (t = 1, …, T), d_{it-1} refers to the lagged value of democracy, y_{it-1} is the lagged log income per capita, X'_{it-1} is a vector of lagged control variables; δ_i and μ_t capture the unobserved country-specific fixed heterogeneity and unobserved time effects, respectively. u_{it} is the error term with E(u_{it}) = 0 for all i and t. Since there can be a potential heteroskedasticity issue in the estimation, standard errors are clustered at the country level.

The dynamic panel fixed effects linear regression model will be also estimated by the method developed by Driscoll and Kraay (1998) for further specifications. In particular, the data that we employ in the analysis might be characterized by complex error structures which indicates that the disturbances are likely to be heteroskedastic and contemporaneously correlated across panels. In particular, this method provides a way to solve diagnostic problems emerging in fixed effects models. In case of time span is large enough, this method asserts that the standard non-parametric time-series covariance matrix estimators can be used for all general forms of spatial and periodic correlations as robust. The Newey-West type of correlation for the average cross-section series are the basis of the methodology for Driscoll and Kraay (1998).

Irrespective of cross-sectional dimension of the number of groups, the corrected standard error estimators are provided the consistency of the covariance matrix estimators. These are also consistent even in the presence of heteroskedasticity when time span and the number of groups are large enough. Therefore, the corrected standard error estimators produce robust standard errors in the context of there is a spatial and cross-sectional dependence. Equation (2) is based on the disturbance term in which it is heteroskedastic, autocorrelated, and cross-sectionally correlated:

$$\hat{\beta} = (XX')^{-1}XY' \quad (2)$$

The standard errors of parameter estimators are obtained by means of the square terms of diagonal elements of asymptotic covariance matrix as follows in Equation (3):

$$V(\hat{\beta}) = (XX')^{-1}\hat{S}_T(XX')^{-1} \quad (3)$$

where

$$\hat{S}_T = \hat{\Omega}_0 + \sum_{j=1}^{m(T)} w(j,m)[\hat{\Omega}_j \hat{\Omega}_j'] \quad (4)$$

m(T) denotes the lag period of autocorrelation and the Barlett weights, which is produced as w(j, m(T) = j / m(T) + 1), and leads that $\hat{S}_T$ is positive. It also indicates that high-order lags are emerged in low weights in the autocorrelation function.

Additionally, $\hat{\Omega}_j$ matrix is defined as follows in Equation (5):

$$\hat{\Omega}_j = \sum_{t=j+1}^{T} h_t(\hat{\beta}) h_{t-j}(\hat{\beta})' \quad (5)$$

where $h_t(\hat{\beta})$ is equal to $\sum_{i=1}^{N(t)} h_{it}(\hat{\beta})$.

The covariance matrix estimator developed by Driscoll and Kraay (1998), which is estimated by Equation (4) and Equation (5), is the same produced by Newey-West type robust covariance matrix estimator in which there is heteroskedasticity and autocorrelation in the error term. By employing this estimator, the standard errors will be consistent, irrespective from the dependence of units to the cross-sectional dimension. Moreover, the consistency condition will be significant even the number of panel goes infinity, which will be valid for the general forms of spatial and periodical correlations.

Acemoglu et al. (2008) also use the difference-GMM estimator as developed by Arellano and Bond (1991) to deal with any possible correlation between δ_i and d_{it-1} in estimating Equation (1). Therefore, Equation (6) shows the first-difference transformation which eliminates the country-fixed effects δ_i:

$$\Delta d_{it} = \alpha \Delta d_{it-1} + \gamma \Delta y_{it-1} + \Delta X_{it-1}' \beta + \Delta \mu_t + \Delta u_{it} \quad (6)$$

where Δ is the first-difference operator, e.g., $\Delta d_{it-1} = d_{it} - d_{it-1}$ and the orthogonality conditions are based on $E(d_{it-j} \Delta u_{it}) = 0$ for all $t = 3,\ldots,T$ and $2 \leq j \leq T - 1$. In the orthogonality conditions d_{it-j} denotes the proper lags of the dependent variables. The instruments for the residuals of Equation (1) in differences are captured through the second and further lags of the dependent variable (Heid et al. 2012: 2). As Che et al. (2013: 161) consistently argue that since the d_{it-1} is a function of u_{it-1} and thereby $\text{Cov}(\Delta d_{it-1}, \Delta u_{it}) \neq 0$, the OLS estimation in Equation (6) will biased estimate of α and therefore *y* will also be biased alike. The second and further lags of dependent variables are used as instruments for Δd_{it-1} due to provide a consistent estimation of Equation (6) given there is no second-order serial correlation in Δu_{it}. Arellano and Bond (1991) suggest that the use of AR(2) test to control whether the second-order serial correlation of Δu_{it} exists or not and indicate the significance of Hansen (1982) *J*-test to detect whether the orthogonality conditions prevail or not.

However, this estimator is encountered with severe weak instrument problem because there is a high persistence of dependent variable over time and the number of time periods is small. A common strategy to reduce the negative impact of this problem is to use five-year intervals of panels. However, this may not solve the weak instrument problem but it can reduce the number of observations considerably which results in unreliable point estimates

and hypothesis tests. To eliminate this issue, Arellano and Bover (1995) and Blundell and Bond (1998) suggest transforming the Equation (1) in levels by augmenting the difference-GMM method in which the lagged first-differences of the dependent variable is used as the instrument for the lagged dependent variable[10]. Therefore, the moment conditions change for this new estimator provided by Arellano and Bover (1995) and Blundell and Bond (1998) as follows:

$$E\left(\Delta d_{it-1}(\delta_i + u_{it})\right) = 0 \;\; for\; t = 3, \dots, T \tag{7}$$

The validity of this estimator is tested by the difference Hansen (1982) *J*-test. This extended method is referred to as the system-GMM. While the system-GMM estimator provides asymptotic efficiency gains together with the moment conditions developed by Arellano and Bover (1995) and Blundell and Bond (1998), it violates the Hansen (1982) *J*-test for the orthogonality condition in which E($d_{it-j}\,\Delta u_{it}$) = 0 or the difference Hansen (1982) *J*-test for the orthogonality condition in which E($\Delta d_{it-1}(\delta_i + u_{it})$) = 0, as the number of instruments increase with the time dimension *T*. In other words, there is a positive link between the number of instruments and the time periods. As the time period increases, it leads to an increase in the number of instruments[11]. The proliferation of the number of instruments induces to a finite sample bias owing to the overfitting of endogeneous variables and provides a false output in terms of the specification tests such as Hansen (1982) *J*-test covering both level and difference equations (Roodman, 2009a). Roodman (2009a) also argues that the symptoms of instrument proliferation can be ranged as follows: (i) overfitting endogenous variables, (ii) imprecise estimates of the GMM optimal weighting matrix, and (iii) bias in two-step standard errors. According to Roodman (2009a), collapsing instruments, which reduce the number of instrument, substantially leads to eliminate finite sample bias and thus strengthens the power of the Hansen (1982) *J*-test and the difference Hansen *J*-test for the validity of orthogonality conditions. While we follow the estimation procedure of Acemoglu et al. (2008), we also use system-GMM method with collapsing instruments matrix.

Finally, following Moral-Benito and Bartolucci (2012: 845), we allow for non-linear specifications based on the inclusion of a square term of income as obtained in Equation (8):

$$d_{it} = \alpha d_{it-1} + \beta_1 y_{it-1} + \beta_2 y_{it-1}^2 + \mu_t + \delta_i + u_{it} \tag{8}$$

In contrast to the Equation (1) and Equation (6), the effect of GDP per capita on the measures of democracy is given by $\beta_1 + 2\beta_2 y_{it-1}$, which is linearly subject to the level of income. If we assume that $\beta_2 < 0$, the model given in Equation (8) becomes quadratic function with a maximum at $y^* = -(\beta_1/2\beta_2)$ (Moral-Benito and Bartolucci, 2012: 845). The optimum point of y* refers to the fact that democracy in advanced economies with income below y* positively responds to changes in income. Therefore, the optimum point of y* is the income threshold point in which the above number eliminates the positive effect and turns to be a negative.

[10] For instance, time-differenced instruments for the Eq. 1 in levels are also added by Arellano and Bover (1995) into the model, which are only notable if the orthogonality conditions of the fixed effects are well-established. However, according to Acemoglu et al. (2008: 819), this does not seem to be case because "…five-year income growth is unlikely to be orthogonal to the democracy country fixed effects."

[11] For more information about size distortion, please see Andersen and Sørensen (1996), Bowsher (2002), and Roodman (2009a).

EMPIRICAL RESULTS

Baseline Analysis

In the baseline results, we provide the empirical outcomes of the Equation (1) for the period 1960-2000 by employing annual, five-year, ten-year, and twenty-year data. Table 3 benefits from the Freedom House Political Rights data and Table 4 benefits from Polity IV data. The standard errors are fully adjusted from the diagnostic problems including both arbitrary heteroskedasticity and serial correlation which are clustered at the country level[12].

The first columns of Table 3 and Table 4 provide the estimation results from the standard pooled OLS regressions using the five-year data. Both regressions of the measures of democracy and the log GDP per capita have (five-year) lags in control of full set of time dummies. The estimation results show that a high persistence is prevailing for the lagged democracy variables in which both of them are highly statistically significant and positive. The same conditions are also notable for the lagged value of log GDP per capita, which indicate that there is a positive relationship between democracy and income.

Similar to the estimation results for the whole sample used by Acemoglu et al. (2008), the effect of income on democracy is very marginal. For example, the coefficient of 0.083 (standard error = 0.022) in column 1 of Table 3 implies that a 1 percent increase in GDP per capita follows 0.083 increase in the degree of democracy measured by the Freedom House index. In order to test the causal linkage between these two variables, we also use the same procedure done by Acemoglu et al. (2008) which is called as the implied cumulative effect of income. If there is a causal relationship between democracy and income, the long-run effect of income should be larger on democracy due to the high persistence of the dependent variable[13].

Table 3: Baseline Results Using Freedom House Measure of Democracy

	Base Sample, 1960-2000								
	Five-year data					Annual data	Ten-year data		Twenty-year data
	Pooled OLS	Fixed Effects OLS	Anderson-Hsiao IV	Arellano-Bond GMM	Fixed Effects OLS	Fixed Effects OLS	Fixed Effects OLS	Arellano-Bond GMM	Fixed Effects OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable is democracy								
Democracy$_{t-1}$	0.658***	0.502***	0.668***	0.697***		0.743***	0.329	0.425***	-0.124
	(0.065)	(0.102)	(0.195)	(0.128)		(0.049)	(0.207)	(0.140)	(0.229)
Log GPP per capita$_{t-1}$	0.083***	0.112**	0.161*	0.108**	0.153	0.071**	0.370***	0.379***	0.314
	(0.022)	(0.051)	(0.088)	(0.055)	(0.098)	(0.036)	(0.111)	(0.074)	(0.199)
Hansen *J*-test				[0.69]				[0.03]	
AR(2) test				[0.48]				[0.65]	
Implied cumulative effect of income	(0.243)	(0.225)	(0.485)	(0.356)		(0.276)	(0.551)	(0.659)	(0.279)
Observations	316	316	293	239	320	800	125	98	52
Countries	47	47	39	39	47	35	28	27	27
R-squared	0.68	0.73			0.64	0.92	0.79		0.89

*Notes: ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.*

In addition to pooled OLS regression, we also apply the fixed effects method at the country level. Once fixed effects are included in the regressions, the relationship between democracy and income becomes controversial. For instance, in Table 3 with Freedom House

[12] For more information, please see Wooldridge (2002).

[13] For instance, the cumulative effect of a 1 percent increase in income is 0.083 / (1 - 0.658) ≈ 0.243, which is higher than the coefficient of GDP per capita. For more information, please see Acemoglu et al. (2008: 817).

data, the estimate of γ is statistically significant, whereas in Table 4 with Polity IV data, the estimate of γ becomes positive but insignificant. The lack of relationship in the fixed effect regressions for five-year data may result from the exclusion of the presence of cross-sectional dependence. Therefore, together with the other diagnostic issues such that heteroskedasticity and serial correlation, one should consider the impact of cross-sectional dependence on standard errors. However, even if the measure of democracy data taken from the Polity database is not significant in almost all fixed effects regression, the statistical significance of γ is still notable for the estimations done by the Freedom House data. Therefore, the plots in Figure 2 and Figure 3 for advanced economies which show no strong relationship between income growth and changes in democracy over the period 1960-2000 becomes vulnerable to the regression results.

The remaining columns show the alternative specifications to control the potential biases due to the presence of lagged democracy variable. To check this problem, we follow two econometric procedures so-called instrument-variable (IV) method and generalized method of moments provided by Anderson and Hsiao (1982) and Arellano and Bond (1991), respectively. For the Anderson-Hsiao IV method, the estimation results show that the coefficient of GDP per capita is still positive but only statistically significant in Table 3 measured by the Freedom House data. In other words, we find that this procedure leads to the fact that the estimations provided by the Polity IV data are much controversial than the Freedom House data and clearly blur the evidence in contrast to the positive relationship between democracy and income.

Table 4: Baseline Results Using Polity IV Measure of Democracy

	Base Sample, 1960-2000								
	Five-year data					Annual data	Ten-year data		Twenty-year data
	Pooled OLS	Fixed Effects OLS	Anderson-Hsiao IV	Arellano-Bond GMM	Fixed Effects OLS	Fixed Effects OLS	Fixed Effects OLS	Arellano-Bond GMM	Fixed Effects OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable is democracy								
$Democracy_{t-1}$	0.684***	0.570***	0.503**	0.587***		0.960***	0.389***	0.588***	-0.311
	(0.078)	(0.123)	(0.246)	(0.142)		(0.035)	(0.131)	(0.103)	(0.190)
Log GPP per $capita_{t-1}$	0.076***	0.095	0.096	0.031	0.147	0.024*	0.406***	0.329***	0.506*
	(0.029)	(0.062)	(0.192)	(0.059)	(0.116)	(0.012)	(0.121)	(0.069)	(0.284)
Hansen *J*-test				[0.84]				[0.06]	
AR(2) test				[0.33]				[0.28]	
Implied cumulative effect of income	(0.241)	(0.221)	(0.193)	(0.075)		(0.60)	(0.664)	(0.798)	(0.385)
Observations	286	286	265	265	292	1075	123	97	51
Countries	41	41	34	34	41	33	27	26	26
R-squared	0.70	0.74			0.60	0.97	0.76		0.86

*Notes: ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.*

Though the instrumental variable estimator of the Anderson-Hsiao method provides consistent estimation by way of reducing the potential biases, it is not efficient due to the fact that it does not consider the correlation of further lags of Δd_{it-1} with the u_{it}, which of these can also be used as additional instruments. To eliminate this kind of problem, we use GMM estimator developed by Arellano and Bond (1991), which considers all moment conditions. If these moment conditions are prevailing, it can be argued that the GMM estimator is more efficient than the Anderson-Hsiao IV estimator. In Table 3 and Table 4, the estimation results of Arellano-Bond GMM estimator are obtained in column 4. Whereas the coefficient is more positive and statistically significant in Table 3 (i.e., γ = 0.108; standard error = 0.055), the

same condition becomes invalid in Table 4. Moreover, since the GMM method provides to use of additional instruments in order to test the assumption of no serial correlation in u_{it}, and examine the overidentifying restrictions. In Table 3 and Table 4, these test results are shown in AR(2) test and Hansen *J*-test, respectively. Both with the Freedom House and Polity IV data, the estimation results show that there is no further serial correlation. In addition, the overidentifying restrictions are not rejected to the degree of Hansen *J*-test. Since the estimations in Table 4 with Polity IV data are insignificant even if they are positive (there is no problem in AR(2) test and Hansen *J*-test, this leads us to interpret the results of the relationship between democracy and income in caution.

For the five-year data, the last estimation in column (5) is based on the exclusion of the lagged value of democracy. With either the Freedom House and Polity IV measure of democracy, the coefficient γ is positive but insignificant, which shows that further evidence on the democracy-income nexus is not available in the context of this simpler specification. Following Acemoglu et al. (2008), in column (6) we employ annual data. The major factor to adopt in annual observations, the fixed effects estimations provide more consistent results than the results provided by five-year observations since the number of observations reduce in the latter one. However, in contrast to the estimation procedure of Acemoglu et al. (2008) in which they include five lags of both democracy and log GDP per capita, we do not follow this way due to the fact that the number of advanced economies are not many which then does not significantly increase the number of observations; and the panel structure is unbalanced which further reduce the number of observations. Therefore, five lags of both of these two variables can produce inefficient estimations results. Though the five lags of democracy and log GDP per capita are not included into the regressions, there is still further evidence of a significant and positive effect of income on democracy for the case of both Freedom House and the Polity IV data.

Column (7) and column (8) estimate the similar specifications for the democracy-income nexus at lower frequencies by using ten-year data. With Freedom House data, the results are similar to the data set of five-year observations and statistically more significant than the previous one. In addition, with the Polity data, the results are also highly statistically significant and still positive. The interesting point is the fixed effects and Arellano-Bond GMM estimators are statistically significant in column (7) and column (8), whereas the same procedure used in column (2) and column (4) provide insignificant results for Polity IV data. Finally, in column (9), we use twenty-year data and find that the only significant evidence is obtained in Table 4 with the Polity IV data. However, the number of observations sharply decreased in estimating the specifications with the data set of twenty-year observations. Therefore, democracy does not continue to be highly persistence over time, which then erodes the consistency of the estimations. However, once again the positive relationship between democracy and income maintains within the context of Equation (1).

All in all, contrary to the estimations of Acemoglu et al. (2008) which provide an insignificant result for the case of democracy-income nexus in control of the inclusion of fixed effects proxying for time-invariant country-specific characteristics, by focusing only to the advanced economies for the sample, the same data set of Acemoglu et al. (2008) provides statistically significant estimations over the period 1960-2000. Hence, the results show that the conventional wisdom for the democracy-income nexus is prevailing for the advanced economies at least. However, the existing specifications need further analyses in order to check robustness for the positive relationship between democracy and income. Therefore, in the following sub-sections, we deal with these topics.

Robust Standard Errors Estimation Results

Table 5 examines the relationship between democracy and GDP per capita by employing Driscoll and Kraay (1998) method. The standard errors are robust to heteroskedasticity, autocorrelation and cross-sectional dependency. Similar to the baseline estimations, we first employ five-year data to provide empirical results from the fixed-effects specifications. Both democracy measures and log GDP per capita have five-year lags in control of full set of dummies. The five-year estimation results show that a high persistence is still valid for the lagged values of democracy measures in which the coefficients are highly statistically significant and positive in each specification. The coefficient of log GDP per capita is also statistically significant and positive for every regression. Therefore, as in the baseline estimations, we can argue that there is a positive relationship between democracy and income even in controlling for all diagnostic problems in the context of producing robust standard errors.

The remaining columns show that the employment of annual and ten-year data provide almost the same empirical results, which are controlled for potential biases due to the presence of lagged democracy variable. We still find that the empirical results provided by Driscoll and Kraay (1998) method lead to the fact that the Polity IV data estimates are somewhat similar to the Freedom House data for democracy even in the control of diagnostic issues covering both heteroskedasticity, autocorrelation and cross-sectional dependency. Therefore, the same policy conclusions can be also made for both of these democracy variables considering the empirical results provided by Driscoll and Kraay (1998) method.

Table 5: Robust Standard Errors Estimation Results

	Five-year data		Annual data	Ten-year data	Five-year data		Annual data	Ten-year data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable is Freedom House measure of democracy				Dependent variable is Polity IV measure of democracy			
Democracy$_{t-1}$	0.502***		0.743***	0.329*	0.570***		0.959***	0.389*
	(0.132)		(0.063)	(0.177)	(0.121)		(0.023)	(0.218)
Log GDP per capita $_{t-1}$	0.112***	0.152***	0.071***	0.370***	0.095***	0.147***	0.023	0.405***
	(0.039)	(0.046)	(0.029)	(0.118)	(0.024)	(0.032)	(0.014)	(0.078)
Observations	316	320	800	125	286	292	1075	123
Countries	47	47	35	28	41	41	33	27
R-squared	0.42	0.23	0.74	0.54	0.45	0.18	0.92	0.48

*Notes: ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.*

Robustness Checks

Table 6 investigates the robustness of the estimations obtained in Table 3 and Table 4 by using additional variables such as log of population, education level, and median age. While columns (1)-(4) show the estimation results for the Freedom House data, columns (5)-(8) produce the estimation results for the Polity IV data. Both of these regressions, in essence, replicate the same methods for five-year data used in baseline estimations by excluding pooled OLS and Anderson-Hsiao IV. Column (1) and column (2) include two additional variables (i.e., log of population and median age) into the regressions corresponding to column (2) and column (4) of Table 3 for advanced economies covering the period 1960-

2000. The inclusion of additional variables has changed the whole structure of the results obtained in Table 3 and Table 4[14].

In each regression, we replicate the estimates in baseline analysis by using the same methods. Therefore, each specification includes both fixed effect and GMM estimators. In contrast to the earlier estimation results provided in Table 3 and Table 4, the covariates have an ample effect on democracy-income nexus by making the estimates insignificant in almost all models. In addition to democracy and log GDP per capita variables, all additional instruments are insignificant in all regressions. Thus, as Acemoglu et al. (2008: 820) state that the causal effects of these variables on democracy measures, which are the basic factors of the modernization theory, especially the education, are thus not robust when the regressions are allowed for the country fixed effects. However, this is just one side of the whole picture to recognize the arguments of Acemoglu et al. (2008) in terms of advanced economies. Hence, we have to introduce another way of looking at alternative procedures. In that vein, the following sub-section practice the estimates of system-GMM by collapsing instruments and using two-step procedure. In addition, we also extend difference-GMM in case of a two-step procedure.

Table 6: Robustness Checks Using the Measures of Democracy

	Base Sample, 1960-2000							
	Five-year data							
	Fixed Effects OLS (1)	Arellano-Bond GMM (2)	Fixed Effects OLS (3)	Arellano-Bond GMM (4)	Fixed Effects OLS (5)	Arellano-Bond GMM (6)	Fixed Effects OLS (7)	Arellano-Bond GMM (8)
	Dependent variable is democracy							
Democracy$_{t-1}$	0.421***	0.666***	0.414***	0.651***	0.499***	0.526***	0.498***	0.509***
	(0.124)	(0.117)	(0.127)	(0.115)	(0.148)	(0.147)	(0.148)	(0.150)
Log GDP per capita$_{t-1}$	0.126	0.258*	0.127	0.230	0.110	0.035	0.104	0.049
	(0.085)	(0.155)	(0.088)	(0.162)	(0.092)	(0.099)	(0.089)	(0.096)
Log population$_{t-1}$	0.191	-0.272	0.172	-0.265	0.255	0.341	0.244	0.334
	(0.192)	(0.238)	(0.177)	(0.245)	(0.219)	(0.176)	(0.210)	(0.172)
Education$_{t-1}$			0.012	-0.002			0.009	0.005
			(0.017)	(0.024)			(0.023)	(0.034)
Age structure$_{t-1}$	0.024	0.010	0.022	0.012	0.002	0.004	0.002	0.002
	(0.024)	(0.026)	(0.026)	(0.028)	(0.030)	(0.038)	(0.031)	(0.039)
Hansen *J*-test		[0.73]		[0.92]		[0.83]		[0.98]
AR(2) test		[0.42]		[0.42]		[0.36]		[0.34]
Implied cumulative effect of income	(0.217)	(0.796)	(0.217)	(0.659)	(0.219)	(0.073)	(0.207)	(0.099)
Observations	272	232	256	224	251	210	242	209
Countries	43	35	34	33	40	33	32	32
R-squared	0.71		0.71		0.70		0.71	

*Notes: ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. Education is the average years of schooling in the population. In each regression, we also add another four covariates of the age structure at t-1 but do not display in the table. These age structures include the following age groups: 0-15, 15-30, 30-45, and 45-60. Acemoglu et al. (2008) classify this age groups on the basis of the study of Barro (1999).*

Further Estimates Using System-GMM

Table 7 and Table 8 report further estimates on the basis of system-GMM with two-step and collapsing instruments. In addition, we do not only depend on system-GMM estimations but also provide difference-GMM results with two-step estimations. While from column (1) to column (3) replicates the baseline estimations, column (4)-(8) reports additional estimations. We employ a dataset of five-year observations of Acemoglu et al. (2008) alike. Since from column (1) to column (3) provides the same results of the baseline specifications,

[14] The coefficient γ is only significant in column 2. However, high persistence of the democracy measure is still valid in each specification.

we start to interpret the estimations by column (4). Column (4) and column (5) employ two-step difference GMM estimator. Similar to the earlier estimation procedures, we use robust option and treat the lagged values of democracy measure as predetermined in all GMM estimations. In column (5), however, we also treat log GDP per capita as endogenous[15]. All difference-GMM estimates prove that the positive effect of income on democracy is much stronger relative to the initial results provided in column (1)-(3). While these results are valid for estimating the measure of democracy with the Freedom House index, the Polity IV data gives controversial outcomes. The difference-GMM estimates with Polity IV data of democracy are not statistically significant even if the coefficients are positive in all specifications. However, the coefficients of democracy in Table 7 and Table 8 are still highly significant, which indicate that the high persistence of the variable is still prevailing. As we pointed out in previous section that both one- and two-step differenced-GMM estimators do not allow this high persistence characteristics of the democracy measure. Therefore, in column (6)-(8), we implement one- and two-step system-GMM estimations also with collapsing instrument matrix. Both with Freedom House and Polity IV data for the measure of democracy, we obtain positive and statistically significant estimation results in most of the specifications. However, the use of collapsing instruments eliminates the significance of the coefficients as figured out in column (8)[16]. Finally, for Hansen *J*-test, in all regression, we do not reject the null hypothesis which shows the validity of the overidentifying restrictions. Overall, we can further suggest that the positive relationship between the measure of democracy and log GDP per capita is still valid and persistent in control of two-step differenced-GMM and system-GMM estimations.

Table 7: System-GMM Estimations Using Freedom House Measure of Democracy

	Base Sample, 1960-2000							
	Five-year data							
	Pooled OLS	Fixed Effects OLS	Diff-1 GMM	Diff-2 GMM	Diff-2 GMM END	Sys-2 GMM	Sys-2 GMM END	Sys-2 GMM CL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable is democracy							
Democracy$_{t-1}$	0.657***	0.502***	0.696***	0.695***	0.624***	0.597***	0.577***	0.790***
	(0.065)	(0.102)	(0.127)	(0.127)	(0.089)	(0.089)	(0.070)	(0.149)
Log GDP per capita$_{t-1}$	0.082***	0.112**	0.108**	0.110*	0.169***	0.111***	0.110***	0.063
	(0.022)	(0.051)	(0.054)	(0.057)	(0.066)	(0.032)	(0.040)	(0.048)
Controls	No	No	No	No	No	No	No	No
Hansen *J*-test			[0.69]	[0.69]	[1.00]	[0.84]	[1.00]	[0.14]
Diff-in-Hansen test			[0.38]	[0.38]	[1.00]	[1.00]	[0.64]	[0.94]
AR(1) test			[0.01]	[0.04]	[0.04]	[0.04]	[0.04]	[0.03]
AR(2) test			[0.48]	[0.52]	[0.53]	[0.46]	[0.46]	[0.45]
Implied cumulative effect of income	(0.239)	(0.224)	(0.355)	(0.360)	(0.449)	(0.275)	(0.260)	(0.30)
Observations	316	316	293	293	293	306	306	306
Countries	47	47	39	39	39	43	43	43
R-squared	0.68	0.73						

*Notes: ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.*

[15] We follow Heid et al. (2012) in terms of determining the potential endogeneous variables.
[16] For more information on statistical background, please see Roodman (2009a, 2009b).

Table 8: System-GMM Estimations Using Polity IV Measure of Democracy

	Base Sample, 1960-2000							
	Five-year data							
	Pooled OLS	Fixed Effects OLS	Diff-1 GMM	Diff-2 GMM	Diff-2 GMM END	Sys-2 GMM	Sys-2 GMM END	Sys-2 GMM CL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable is democracy							
Democracy$_{t-1}$	0.684***	0.570***	0.587***	0.586***	0.458***	0.536***	0.612***	0.732***
	(0.078)	(0.123)	(0.142)	(0.146)	(0.107)	(0.132)	(0.070)	(0.154)
Log GDP per capita$_{t-1}$	0.076***	0.095	0.030	0.029	0.078	0.140***	0.108	0.067
	(0.028)	(0.061)	(0.059)	(0.060)	(0.067)	(0.047)	(0.108)	(0.050)
Controls	No	No	No	No	No	No	No	No
Hansen *J*-test			[0.84]	[0.84]	[1.00]	[0.97]	[1.00]	[0.05]
Diff-in-Hansen test			[0.03]	[0.03]	[0.67]	[0.09]	[0.19]	[0.87]
AR(1) test			[0.02]	[0.09]	[0.09]	[0.09]	[0.08]	[0.09]
AR(2) test			[0.33]	[0.37]	[0.39]	[0.40]	[0.39]	[0.40]
Implied cumulative effect of income	(0.240)	(0.220)	(0.072)	(0.070)	(0.413)	(0.301)	(0.278)	(0.250)
Observations	286	286	265	265	265	276	276	276
Countries	41	41	34	34	34	38	38	38
R-squared	0.70	0.74						

*Notes: ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.*

Non-Linear Specification Results

Table 9 and Table 10 report the non-linear – flexible – estimates which are based on measuring Eqs. (1) and (2). The estimation procedures are totally the same in Table 3 and Table 4. However, the only difference from the others is the inclusion of square log GDP per capita into regressions by way of implementing the empirical method provided by Moral-Benito and Bartolucci (2012). Column (1)-(5) illustrates the estimation results using five-year data. Once we add the square log GDP per capita into the specifications, the estimations obtained in Table 3 and Table 4 become more significant in statistical bound. This case is also relevant for the estimations using annual, ten-year, and twenty-year panels. However, while the estimations with Freedom House data prove that these conditions are highly significant for the variables using in Table 9, the regression results are much different from being in unity in Table 10 with Polity IV data. In other words, even if there are significant estimates in these regressions on the basis of Polity IV data, they are weakly significant in comparison to the estimates obtained by Freedom House data. The results show that the initial effect of log GDP per capita on democracy is positive whereas the latter effect turns into negative. In other words, in the latter stages of an increase in income negatively affect democracy measures. The acquisitions in the level of democracy are eroded over time due to different factors but most specifically to the changing dynamics of the power of income segments in the society. Though there are critical points to be focused on in these estimations, especially in terms of Polity IV data, the regression results support the positive and significant correlation between log of GDP per capita and democracy.

Table 9: Non-Linear Specifications Using Freedom House Measure of Democracy

	Base Sample, 1960-2000								
	Five-year data					Annual data	Ten-year data		Twenty-year data
	Pooled OLS	Fixed Effects OLS	Anderson-Hsiao IV	Arellano-Bond GMM	Fixed Effects OLS	Fixed Effects OLS	Fixed Effects OLS	Arellano-Bond GMM	Fixed Effects OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable is democracy								
$Democracy_{t-1}$	0.656***	0.489***	0.745***	0.626***		0.706***	0.268	0.352**	-0.052
	(0.063)	(0.102)	(0.191)	(0.117)		(0.055)	(0.202)	(0.157)	(0.127)
Log GPP per $capita_{t-1}$	1.191***	1.555***	-3.387	1.039**	1.846***	1.076***	2.798***	2.141***	2.771***
	(0.246)	(0.380)	(3.245)	(0.472)	(0.596)	(0.263)	(0.744)	(0.505)	(0.410)
(Log GPP per $capita_{t-1})^2$	-0.061***	-0.083***	0.250	-0.058**	-0.098***	-0.055***	-0.146***	-0.108***	-0.151***
	(0.013)	(0.219)	(0.231)	(0.028)	(0.035)	(0.014)	(0.040)	(0.028)	(0.027)
Hansen *J*-test				[0.68]				[0.03]	
AR(2) test				[0.56]				[0.89]	
Observations	316	316	293	290	320	800	125	95	52
Countries	47	47	39	39	47	35	28	27	27
R-squared	0.69	0.74			0.66	0.92	0.83		0.97

*Notes: ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.*

Table 10: Non-Linear Specifications Using Polity IV Measure of Democracy

	Base Sample, 1960-2000								
	Five-year data					Annual data	Ten-year data		Twenty-year data
	Pooled OLS	Fixed Effects OLS	Anderson-Hsiao IV	Arellano-Bond GMM	Fixed Effects OLS	Fixed Effects OLS	Fixed Effects OLS	Arellano-Bond GMM	Fixed Effects OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable is democracy								
$Democracy_{t-1}$	0.675***	0.553***	0.535**	0.550***		0.959***	0.366***	0.438***	-0.188***
	(0.074)	(0.123)	(0.269)	(0.153)		(0.032)	(0.095)	(0.094)	(0.058)
Log GPP per $capita_{t-1}$	0.944***	1.237*	-3.656*	0.588	1.844	0.077	2.390***	1.351*	3.580***
	(0.367)	(0.636)	(2.070)	(0.932)	(1.142)	(0.126)	(0.829)	(0.714)	(0.753)
(Log GPP per $capita_{t-1})^2$	-0.048***	-0.067*	0.270*	-0.028	-0.099	-0.003	-0.121***	-0.062	-0.197***
	(0.020)	(0.037)	(0.150)	(0.057)	(0.066)	(0.007)	(0.050)	(0.044)	(0.044)
Hansen *J*-test				[0.86]				[0.01]	
AR(2) test				[0.32]				[0.35]	
Observations	286	286	265	262	292	1075	123	94	51
Countries	41	41	34	34	41	33	27	26	26
R-squared	0.71	0.74			0.62	0.97	0.78		0.96

*Notes: ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.*

CONCLUDING REMARKS

In this paper, we focused on widely-known traditional wisdom so-called the modernization theory in terms of advanced economies over the period 1960-2000. According to Acemoglu et al. (2008), the relationship between democracy and income is spurious for the period covering both the long-run and very long-run due to societies embarked on divergent political-economic development paths at certain critical junctures. In other words, instead of using economic indicators to reveal the democracy-income nexus, the other potential determinants from different paradigms should be taken into account in order to get more information about the historical process of these two indicators.

In that vein, we employed the same data set of Acemoglu et al. (2008) to measure this same correlation in terms of advanced economies over the period 1960-2000 by using different procedures. However, the empirical results obtained from the baseline estimations showed that the relationship between democracy and income is positive and statistically significant in almost all specifications. Therefore, we reject the hypothesis provided by Acemoglu et al. (2008) in which they do it for the whole sample countries. Additionally, the estimation results provided by Driscoll-Kraay method give similar outcomes in fixed-effects models. Moreover, we also use the same robustness procedures to prove that the estimates are still relevant, especially using in Freedom House data of democracy. However, the Polity IV data is not statistically significant in most of the regressions even if the coefficients are positive. The unique difference of this study from the estimations of Acemoglu et al. (2008) is

the inclusion of a new method to solve weak instruments problem, which is called as system-GMM. We both use one- and two-step system-GMM procedures to check the reliability of the empirical results. The estimations are not different obtained by the fixed effects method. Finally, we also addressed the non-linear – flexible – method of testing the effect of square log of GDP on democracy to understand the initial and further periods changes in this nexus. The empirical results provided by the non-linear method was striking due to the fact that while the initial stages of income increases have a positive effect on democracy this positive linkage turns into a negative in the latter stages of time. The reasons behind this phenomenon can be ranged for the case of each country's economic structure. However, the common point on this issue can be found in the increasing power of elites and raising the unequal distribution of total income among different economic actors.

In the context of these estimation results, we can refer some major points which are effective on the change in the dynamics of the relationship between democracy and income in advanced economies. These factors can be ranged as follows: (i) short-term effects of economic shocks and business cycles, (ii) variations in the composition of an aggregate income, (iii) cross-country differences in political and social dynamics, (iv) the cross-country differences in income shares between capital and labor, (v) the role of legal authorities in the determination of income distribution, and (vi) the growing level of income inequality over time. Therefore, further studies should have more attention on these topics in case of changing socio-economic and political era in advanced countries.

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APPENDIX TABLE A1 – DATA AND SOURCES

Variable	Description	Source
Freedom House Measure of Democracy	Data for 1972-2000 in Freedom House Political Rights Index, original range 1,2,3,…,7 normalized 0-1. Data for 1972 used for 1970.	Freedom House Database
Polity IV Measure of Democracy	Data is measured by the democracy score minus the autocracy score. Original range -10, -9,…,10, normalized 0-1.	Polity IV Database
GDP per Capita	Data is measured as log real GDP per capita (chain method in 1996 prices)	Penn World Tables 6.1
Population	Total population in thousands	World Bank
Education	Average total years of schooling in the population age 25 and over.	Barro and Lee (2000)
Age Structure	Data is based on the median age of the population and fraction of the population.	United Nations Population Division

APPENDIX TABLE A2 – LIST OF COUNTRIES

Country	Code
Andorra	ADO
Antigua	ATG
Argentina	ARG
Australia	AUS
Austria	AUT
Bahamas	BHS
Bahrain	BHR
Barbados	BRB
Belgium	BEL
Brunei	BRN
Canada	CAN
Chile	CHL
Croatia	HRV
Cyprus	CYP
Czech Republic	CZE
Czechoslovakia	CZE_1
Denmark	DNK
Estonia	EST
Finland	FIN
France	FRA
Germany	DEU
Germany, East	DEU_E
Germany, West	DEU_W
Greece	GRC
Hungary	HUN
Iceland	ISL
Ireland	IRL
Israel	IRL
Italy	ITA
Japan	JPN
Korea	KOE
Korea, Rep.	KOR
Kuwait	KWT
Latvia	LVA
Liechtenstein	LIE
Lithuania	LTU
Luxembourg	LUX
Malta	MLT
Netherlands	NLD
New Zealand	NZL
Norway	NOR
Oman	OMN

APPENDIX TABLE A2 – LIST OF COUNTRIES (CONTINUED…)

Country	Code
Panama	PAN
Poland	POL
Portugal	PRT
Qatar	QAT
Saudi Arabia	SAU
Seychelles	SYC
Singapore	SGP
Slovakia	SVK
Slovenia	SVN
Spain	ESP
St. Kitts and Nevis	KNA
Sweden	SWE
Switzerland	CHE
Taiwan	TWN
Trinidad and Tobago	TTO
United Arab Emirates	ARE
United Kingdom	GBR
United States	USA
Uruguay	URY