

**Democracy-Growth Nexus and its Interaction Effect on Human Development: A Cross-National Analysis**

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## **Abstract**

This paper examines the democracy-growth nexus and its interactive effect on human development by using cross-national panel data spanning over 20 years incorporating the effect of democratization process. We find evidence that the effect from democracy to human development is nonlinear and varies depending on the levels of growth and democracy. The results confirm that the interaction effect of democracy-growth nexus has a positive impact on human development but the effect is sensitive to democratization process and the level of a country's economic development. It is established that democracy is more crucial in developed countries, whereas economic growth is vital in developing countries. The findings imply that the role of democracy in enhancing human development should not be overemphasized as economic growth is vital in the developing countries.

**Keywords:** *Democracy, Human Development, Economic Growth.*

**JEL classification:** F63, O1, O5

## 1. Introduction

The relationship between income per capita and democracy has been “one of the most notable empirical regularities in political economy” (Acemoglu et al., 2008), and has also been widely investigated by political economy scholars, especially in the wake of an unprecedented expansion of democracy in recent decades (Fortunato, 2015). Narayan et al. (2011) state that economists have researched more the effect of democracy on economic growth, while political scientists have shown the opposite focus, more on the effect of economic growth on democracy. Many studies have identified “democratic institutions” as the main additional missing factors in determining the economic growth (North, 1990; Butkiewicz and Yanikkaya, 2006; Djezou, 2014; Nawaz, 2015).<sup>1</sup> With the rapid rise of the Chinese economy in recent decades and the eclipse of the Arab Spring, there is a renewed research interest in studying whether democratic institutions induce good governance and prosperity and cause economic growth. However, there are a few studies investigating the interactive effects of economic growth and democracy on human development.

Indeed, *The Human Development Report 2002* first identifies the significance of politics in the process of economic development. It claims that sustained poverty reduction requires an equitable distribution of growth but at the same time it necessitates that poor people have the political power. The best way to achieve that goal is to build up strong and deep forms of democratic governance at all levels of society consistent with human development objectives. There is no other way that human rights can be secured other than through a country’s democratisation process.

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<sup>1</sup> Using a panel of 39 member countries of the Organization of Islamic Cooperation, Slesman et al. (2015) find evidence that better-quality political and economic institutions can have positive effects on economic growth, and the quality of political institutions that ensure stable government, less expropriation, and low external conflict are the core dimensions of an institutional matrix because they influence the growth effects of economic institutions.

In the empirical literature, there has always been a controversy over the question whether democracy enhances economic development. One popular view is that democracy enhances human development as democracy serves as a mechanism for redistribution and can keep governments responsible and accountable (see, for instance, Lipset, 1959; Meltzer and Richard, 1981; Dreze and Sen, 1989; Boix, 2001; Lake and Baum, 2001; and Brown and Mobarak, 2009). However, recently several studies claim that there is no positive correlation between regime type and various measure of human development (Shandra et al. 2004; Ross 2006; Acemoglu et al., 2008). The real world evidence provides support of this claim as the most dramatic improvement in human development transpires under the authoritarian rule for example, in the East Asian non-communist countries (Gerring et al., 2012). On the other hand, many democratic countries in the developing world encounter widely persistent disparities in wealth and high level of poverty (e.g. India and many Latin American countries). Despite of the fact that many developing countries observe the considerable progress of human development and democratic transformation in the last decade, there exists a vast difference in the quality of life between developed and developing countries. The conventional wisdom presumes that democracy would lead to higher social spending and this in turn would enhance the welfare of the poor as democratic institutions give people the power to control and discipline the government to ensure the implementation of policies favoring the whole population. It is therefore believed that democratic institutions are both responsive to the demands of constituents and effective in using limited resources to address these demands (Fortunato, 2015). However, recent research has found that there is little or no correlation between public spending and human development outside the OECD countries (Gerring et al., 2012). Thus the question arises, does democracy and economic growth of a country improve the quality of life for its citizen?

The purpose of this study is to revisit the democracy and economic growth relationship and analyse their interactive effects on human development. In particular we estimate the interaction effect of economic growth and democracy to assess whether democratisation process along with economic development accelerates human development by employing a cross-nation analysis approach for over 170 countries. We postulate that a slow process of economic development in developing countries can be mitigated through democratisation process and stronger institutional quality. This study contributes to the understanding of the democracy-growth nexus and their interaction effect on human development by evaluating the cross-sectional panel data and development states of the countries. It is among the first to directly test the interaction effect of democracy and growth on human development using cross-nation panel data spanning over 20 years and by incorporating the effect of democratization process. We find evidence that the effects from democracy to human development is nonlinear and varies depending on the levels of growth and democracy. The major results indicate that democracy enhances human development, but economic growth increases human development only in developing countries. The interaction effect of economic growth and democracy on human development is sensitive to the state of the democratization process, suggesting that democracy is crucial in enhancing human development in transition and democratic countries.

The rest of the paper is structured as follows. Section 2 provides an overview of the democracy, growth and human development relationship. Section 3 presents models, data and methodology, followed by empirical results in Section 4 and conclusion in the final section.

## **2. Democracy, Economic Growth and Human Development Relationship**

The relationship between democracy and economic growth as well as human development has been hotly debated over the past several decades. It seems less arguable that democracy enhances human development (Lipset, 1959; Dreze and Sen, 1989; Brown and Mobarak 2009), but mixed results for whether democracy enhances economic development (Kurzman et al., 2002; Przeworski et al., 2000).

Studies reporting a positive effect of democracy on economic growth argue that, because of the electoral competition, democracy turns out to be a guarantee for effective economic policies, and serves to ensure equal access to public goods and services, help reduce transaction costs, information asymmetries of political organization and income inequality, and maintain political stability and democratic institutions as well as an equitable economic growth (Wittman, 1989; Saint-Paul and Thierry, 1993; Lizzeri and Persico, 2004; Acemoglu et al., 2008). Some recent studies confirm the positive effect of democracy on economic growth (e.g., Rodrik and Wacziarg, 2005; Papaioannou and Siourounis, 2008; Persson and Tabellini, 2009; Heid et al., 2012; Benhabib et al., 2013). Persson and Tabellini (2009) find, on average, a negative effect on growth of leaving democracy. The logic of this argument rests largely on the idea that popular participation in government empowers ordinary citizens, including the very poor, and should, as a result, lead governments to be more accountable to their interests (Gerring et al., 2012).

However, recently several studies claim that there is no positive correlation between regime type and various measure of human development, and no or little evidence to support a positive correlation between public spending and human development outside the OECD (Shandra et al. 2004; Ross 2006; Acemoglu et al., 2008; Gerring et al., 2012). Barro (1997) finds that growth is increasing in democracy at low levels, but the relation turns negative

once a moderate amount of political freedom is attained. There is also a view that democracy is a luxury to be enjoyed only by countries rich enough to afford it, which is especially popular in the developing world. The real world evidence often cited shows that state autonomy appears to have made a positive impact on growth in some of the East-Asian states, providing support of this claim as the most dramatic improvement in human development transpires under the authoritarian rule in the East Asian non-communist countries (Gerring et al., 2012). In contrast, many democratic countries in the developing world encounter widely persistent disparities in wealth and high level of poverty (e.g. India and many Latin American countries). Acemoglu and Robinson (2012) argue that inclusive economic institutions can emerge and encourage growth in the short run but cannot survive in the long run in a nondemocratic regime. Narayan et al. (2011) find evidence from the Sub-Saharan African countries that in the long run democracy Granger causes real income and an increase in democracy has a positive effect on real income only in a few countries, and there is long run Granger neutrality between democracy and real GDP in most countries. Moral-Benito and Bartolucci (2012) also report that “countries that are not fully democratic, may have good economic performances, but once they have good economic results, they hardly change their institutions”.

There is a new trend in the recent years that studies on the nexus between economic growth and democracy move towards a focus on methodology, transmission channels and the durability or the stock of the democracy, and most of the studies report a robust and sizable effect from democracy to growth (Tavares and Wacziarg, 2001; Rodrik and Wacziarg, 2005; Acemoglu, 2008; Heid et al., 2012; Benhabib et al., 2013; Masaki and van de Walle, 2015; Baklouti and Boujelbene, 2016). Tavares and Wacziarg (2001) find evidence that democracy fosters growth by improving the accumulation of human capital and lowering income

inequality, though it also hinders growth by reducing the rate of physical capital accumulation. Rodrik and Wacziarg (2005) report that democratization comes with likely benefits in the form of a short-run boost in growth and reduction in economic volatility. Acemoglu (2008) argues that democratic institutions may perform better than nondemocracies in the long run, though they may create distortions due to their redistributive tendencies. Masaki and van de Walle (2015) conclude that democracy is positively associated with economic growth, especially for countries that have remained democratic for longer periods of time. Similar finding is also reported in Djezou (2014) that, for economic growth and democracy to move together in the long run, they need to be associated with regime durability. Recently, Nawaz (2015) reports that institutions play a greater role in determining growth in developed economies relative to developing economies and different countries require different sets of institutions for ensuring long-term economic growth.

In recent years, there are studies analysing the causal impact of economic globalization on democracy (see, for instance, Lopez-Cordova and Meissner, 2008; Acemoglu and Robinson 2006; Eichengreen and Leblang, 2008). O'Rourke and Taylor (2007) suggest that democratization and higher levels of democracy have a positive effect on trade openness conditional on factor endowments, specifically the capital-labor ratio, in developed and developing countries. Eichengreen and Leblang (2008) also argue that democracy promotes trade openness by using a large sample of developed and developing countries from 1870 to 2000.

In this study, we revisit the democracy-growth nexus and assess their interactive effects on human development by employing a cross-nation analysis approach for over 170 countries. We postulate that the effect from democracy to human development is nonlinear and varies depending on the levels of growth and democracy.

### 3. Models, Data and Methodology

The empirical analysis evaluates the proposed hypotheses noted in the earlier section. In particular, the study examines the moderation effects of democracy and economic growth on human development. In other words, does democracy enrich human development at any level of economic development? And, is economic development improved human development in a democratic environment? The dependent variable in this study human development is measured using human development index. The panel data analysis is conducted over 170 countries for the period 1980-2010.

The base model is structured by incorporating democracy and growth of real GDP per capita and their interactive term as the right-hand-side explanatory variables including control variables. The specification is as follows:

$$HDI_{i,t} = \alpha_1 + \alpha_2 DEMO_{i,t} + \alpha_3 RGDPPCg_{i,t} + \alpha_4 DEMO * RGDPPCg_{i,t} + \alpha_5 CONTROL_{t,t} + \varepsilon_{i,t} \quad (1)$$

where HDI is human development index, DEMO is composite democracy index, RGDPPCg is growth rate of real GDP per capita and CONTROL is control variables and  $i$  is country and  $t$  is the time period and  $\varepsilon$  is error term. Control variables included in the model are government consumption share of GDP (PPP adjusted) and trade openness. These variables are expected to explain the role of government expenditure and globalisation in enhancing human development.

The sign and significance of  $\alpha_2$ ,  $\alpha_3$  and  $\alpha_4$  are of interest. Theories of development suggest that a higher level of democracy over a period of time does ensure improve social welfare (Gerring et al., 2012) and economic growth provides the resources to permit sustained improvements in human development (Ranis et al., 2000). Hence, the coefficients of

democracy and economic growth are expected to be positive. The main focus of the study, the interaction effect is measured by the coefficient  $\alpha_4$  and the developmental argument suggests that the expected sign of the coefficient to be positive. The sign of the control variables are expected to be positive as there is increasing evidence that the incidence of public spending is progressive (see McKay, 2004). The expenditure on social sector—health, education, and sanitation is seen as strongest—but expenditure on rural roads, microcredit and agricultural extension and technology may also be beneficial to the poor, and should benefit the public at large (Morrissey, 2004). Likewise, Harrelson-Stephens and Callaway (2003) find that trade openness is negatively related to human rights violations.

### *3.1. Data*

The human development index (HDI) is a composite index which measures the well-being of people especially the quality of life. The index is obtained from the United Nations Development Programme report. HDI combines indicators of life expectancy at birth, educational attainment by combining a score of adult literacy rate and enrolment ratio and income as adjusted per capita GDP in to a composite index. The three components have the same weight in the index. The advantage of the index is its simplicity which ensures the valid and reliable data for cross-country comparisons. The HDI index ranges from 0 to 1 and the highest possible outcome is 1. Democracy variable (DEMO) is constructed by combining Freedom House political rights and civil liberties (much broader dimension of democracy) indices. The political rights include the electoral process and the political pluralism and functioning of government. The civil liberties encompass freedom of expression and belief, associational and organisational rights, rule of law and personal autonomy and individual rights. Each of the components of political rights and civil liberties are based on multiple

criteria.<sup>2</sup> The composite democracy index is scaled from 1 to 10, where a higher score indicates a higher level of freedom.

Moreover, Polity IV (DEMOP4) data is used as an alternative democracy index for robustness check. The Polity IV data consists of six component measures that record key qualities of executive recruitment, constraints on executive authority, and political competition. The data ranges from -10 to +10, however, we rescaled the index to make it compatible with Freedom House democracy index (DEMOPF), i.e., from 1 (strongly autocratic) to 10 (strongly democratic).<sup>3</sup> Economic variables i.e. real GDP per capita (RGDPPC), government consumption spending (GS) and openness (OPEN) are obtained from Penn World Table version 7.1. The descriptive statistics of all variables are presented in Table 1. It can be seen from Table 1, the variables GS, OPEN, DEMOPF and DEMOP4 exhibit higher standard deviation relative to HDI and real GDP per capita, with OPEN being the highest in terms of standard deviation. Real GDP per capita has the highest kurtosis and the skewness, indicating that positive growth of real GDP per capita is more prevalent. We have conducted the panel unit root test by applying the Levin–Lin–Chu (LLC) test, and the results show that all the series are stationary.

**[Please insert Table 1 about here]**

### *3.2. Methodology*

To investigate the hypothesis that democracy and economic growth jointly affect human development a panel data models for consecutive, non-overlapping, five year periods are

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<sup>2</sup> See <http://www.freedomhouse.org> for details.

<sup>3</sup> See <http://www.systemicpeace.org/polity/polity4.htm> for details.

estimated from 1980 to 2010.<sup>4</sup> All variables are averaged over each five-year period. Our benchmark model (equation 1) is estimated with panel least square (PLS), fixed effects (FE) both country and year and random effects (RE). Using panel FE model is advantageous because FE can control for unobserved time invariant country specific effects. We also estimate the random effect to capture the influence of unobserved factors that may produce heterogeneity across the countries. Wald test is used to determine the significance of explanatory variables and *p*-values suggest that independent variables are jointly significant in explaining the impact on human development. The results are presented after controlling for both heteroskedasticity and serial correlation with robust standard errors

Next, there is a possibility that both democracy and economic growth are endogenous since human development can affect both of these variable. A higher human development can also lead to higher economic growth. To address the problem of endogeneity we re-estimate equation (1) by employing both Two Stage Least Square (TSLS) and System GMM Dynamic Panel (SGDP). Distance from the equator (absolute value) and lag GDP per capita growth and lag democracy variables are used as instruments. Moreover, for the robustness check, we estimate the most advanced System GMM Dynamic Panel (SGDP) estimators introduced by Arellano and Bond (1991) and later developed by Blundell and Bond (2000) and Bond (2002) to address the problem of endogeneity.<sup>5</sup> Lagged differences of variables are used as instruments for both the level and in the first difference equation.

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<sup>4</sup> To eliminate potential business cycle effects that are assumed to be present in annual data a five year average is estimated (Saha and Gounder 2013). The periods are: 1980-84, 1985-89, 1990-94, 1995-99, 2000-04, and 2005-10.

<sup>5</sup> Also, System GMM is used to identify the causal effect of democracy and economic growth on human development as there may be some time-invariant omitted variables influencing political variables, which cannot be controlled for by fixed effects.

#### 4. Empirical Results

In order to estimate the impact of democracy and per capita income growth on human development, we start with an all country case using panel least square and the results are reported in Table 2. The coefficient of real GDP per capita growth in column (1) is positive and significant at the 5% level, suggesting that the growth of per capita income significantly enhances human development. In other words, economic growth provides sufficient means to improve quality of life in a country. With an increase in income countries can allocate resources on education, health and sanitation which in turn increase the level of human development. The result is consistent with the real world evidence such as countries included in Organisation for Economic Co-operation and Development (OECD). Likewise, Freedom House democracy coefficient is positive and significant at the 1% level, implying that a greater democracy enriches human development. Alternatively, democratic countries with checks-and-balances provide enough resources for the improvement of their citizens. A one point increase in democracy index increases HDI by 0.037 points. The result is consistent with the theory and *Human Development Report 2002*. The control variables show some mixed results. Interestingly, the sign of government spending to GDP is negative. However, it is assumed that higher government spending should improve human development. The positive sign of OPEN coefficient indicates that globalisation helps in fostering human development.

**[Please insert Table 2 about here]**

Column (2) estimates the base equation using Polity IV democracy index and the results remain about the same. The positive sign of Polity IV democracy index shows that democracy increases human development and the result is consistent with Freedom House

Democracy index. Columns (3)-(4) and (5)-(6) estimate the fixed effects and random effects respectively and the coefficients democracy index retain the same signs and the significance levels but for real GDP per capita growth the sign became negative and lost the significance level.<sup>6</sup> This result suggests that democracy plays crucial role for improving the quality of life by providing human right than income per capita growth.

The next step divides the total number of countries under examination into developed and developing countries and we repeat the same estimations for each group of countries to identify if there the effects of growth and democracy on human development differ in terms of development (Table 3). The panel least square estimation results reported in columns (7)-(8) and (11)-(12) for the developing and developed countries, respectively. It is noted that columns (7)-(8) (Table 3) exhibit very similar effects of the variables under study on HDI in the developing countries like the whole sample case. Interestingly, the magnitude of the RGDPPCg coefficient is relatively greater indicating that economic growth is much needed in improving human development in developing countries compared to the developed world. On the other hand, the coefficient of RGDPPCg in the developed countries (columns (11)-(12)) is negative and significant, suggesting that growth in income does not produce positive functional effect in enhancing human development in the developed countries. This finding seems to be consistent in some sense with the growth model that the human development of an economy converges towards a steady state rate of development, implying that the human development in the developing countries will be able to “catch up” with that of the developed nations. The results also indicate that the government spending helps in enhancing human development. The OPEN coefficient is positive for both developing and developed country cases. However, large OPEN coefficient in developing countries suggests that globalisation is

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<sup>6</sup> The Hausman test result suggests that fixed effect is a better model than random effect. The result is not reported here available upon request from authors.

more required in these countries than developed countries. In what followed, we explore further the interaction effect to confirm how income per capita growth and democracy work together in affecting human development.

**[Please insert Table 3 about here]**

The issue of simultaneous causation is addressed here using the two-stage least square (TSLS) procedure and employing instrumental variables that may affect economic development but not be affected by human development. Distance from the equator (absolute value) is used as an instrument for per capita income variable. We also use lag economic growth as another instrument for economic development. The latitude distance and lag economic growth variables perform remarkably well from a statistical standpoint. The TSLS estimates show that latitude distance and lag economic growth variables are good predictors of growth in per capita income and also confirm the PLS estimates (column 1), that a higher level of income per capita growth is significantly associated with higher of human development.<sup>7</sup> In addition, the lag democracy instrument is used to control for endogeneity issue raising from democracy and human development. The result suggests that democracy is a way to human development compared to the other way round. The Sargan test for the over identification supports the validity of the instruments.<sup>8</sup>

For the robustness check, the system GMM estimation is conducted and the system GMM results are consistent with TSLS results. The results confirm that democracy and economic growth improve human development in a country.<sup>9</sup> The Sargan tests for over identifying

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<sup>7</sup> The results are not reported here but available upon request from authors.

<sup>8</sup> The results are not reported here but available upon request from authors.

<sup>9</sup> The results are not reported here but available upon request from authors.

restrictions indicate that the instrument choices for the SGMM models are valid. The model also passes the test for the absence of AR-2 process in the differenced error term.

#### *4.1 Interaction effects*

Columns (9) and (10) in Table 3 report the estimation results of the interaction effect of RGDPPCg and DEMO for developing countries. It is found that the interaction term is negative and significant, indicating that the interaction effect of democracy and economic growth reduces human development significantly. In other words, the interaction effect reveals that economic growth (democracy) tend to play a more influential role on boosting human development when the level of democracy (economic growth) is relatively low. Moreover, either economic growth or democracy can cause a strengthening in human development. However, for the developed countries, the interaction term is positive although not significant (Column (13) in Table 3). It suggests democracy and economic growth jointly improve human development in developed countries. Control variables maintain the similar sign and significance level when the interaction term is added. To explore further we examine the interaction effect at three different levels of growth and democracy, i.e., minimum, mean and maximum level, using a partial effect analysis and the results are reported in Table 4.

**[Please insert Table 4 about here]**

As it can be seen in Table 4, for developing countries RGDPPCg increases HDI and the effect is maximum at a low level of democracy but it decreases HDI when democracy is at its

maximum.<sup>10</sup> The results suggest that RGDPPCg increases human development only when democracy is at a low to medium level. In contrast, RGDPPCg decreases human development at all levels of democracy in the developed countries although the negative effect diminishes with democracy level.

On the other hand, the effect of democracy at different level of RGDPPCg shows that when growth level is at minimum, the maximum positive impact of democracy on HDI is seen for developing country and when growth level is maximum democracy affects HDI negatively. In other words, democracy significantly increases human development from minimum to average level of economic growth and the effect is no longer positive at the maximum level of economic growth. Furthermore, when growth level is low democracy is very effective in increasing human development but the positive effect vanishes with development. The developed countries illustrate an opposite scenario. The effect of democracy on HDI is less pronounced when RGDPPCg is minimum but this effect increases with per capita income growth. Overall, the interaction effects suggest that democracy is more crucial in developed countries, whereas economic growth is vital in developing countries. Our results using Polity IV democracy index confirm the findings of Freedom House democracy index.<sup>11</sup> The finding explains why the view remains popular in the developing countries that democracy is a luxury to be enjoyed only by countries rich enough to afford it. Our finding in some sense is also consistent with Nawaz (2015) who reports that institutions play a greater role in determining growth in developed economies relative to developing economies, and different countries require different sets of institutions for ensuring long-term economic growth.

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<sup>10</sup> This finding seems to be consistent with the experience of the developing countries. The development experience of Singapore would be a good case study for this scenario.

<sup>11</sup> The results will be available upon request.

#### *4.2 Impact of democracy on HDI in autocratic, transition and democratic countries*

In the final step, we divide the countries into autocratic, transition and democratic states to examine whether democratic transition and mature democracy enhance human development and the results are reported in Table 5.

**[Please insert Table 5 about here]**

The negative democracy coefficients in columns (15)-(16) show that an expansion of democracy reduces human development in autocratic countries. Even economic growth doesn't have much impact on human development in these countries. On the other hand, a greater democracy helps in enhancing human development in both transition and democratic countries. The magnitude of the democracy coefficient is greater for developed countries compared to the transition countries that confirm our previous results. The growth of per capita real GDP increases human development in transition countries but the effect is much lesser in democratic countries. The results are consistent with developed countries where per capita real GDP growth even reduces human development. The government consumption expenditure has much negative effect on human development in transition and autocratic countries than democratic countries. However, openness plays greater role in enhancing human development in transition countries than democratic countries. Overall, the results show that democracy is important in enhancing human development in transition and democratic countries.

## **5. Conclusion**

This paper empirically evaluates the impact of democracy and economic growth on human development over 170 countries for the period 1980-2010. The results confirm the existence of a nonlinear relationship between democracy and human development, indicating that the levels of economic development and democracy play an important role in determining the interactive effects of growth and democracy on human development. It is found that democracy and economic growth increases human development in the developing countries, while economic growth reduces human development in the developed nations. Democracy is more crucial for improving human development than income per capita growth. These results are robust and do not depend on the use of specific democracy index (Freedom House Democracy index or Polity IV democracy index) and different estimation techniques. The results further confirm that the interaction effect of democracy-growth nexus has a positive impact on human development but the effect is sensitive to the states of democratization process and the levels of economic development. It is established that democracy is more crucial in developed countries, whereas economic growth is vital in developing countries. The finding lends support to the popular view that democracy is a luxury to be enjoyed only by countries rich enough to afford it and is consistent with Nawaz (2015). The partial effect results indicate that democracy increases human development at any level of economic growth in developed countries but the effect is maximum when economic growth is at its highest level. In developing countries economic growth enhances human development at the low to medium level of democracy. Globalisation helps in fostering human development. Overall the results show that democracy is important in enhancing human development in transition and democratic countries.

These results taken together suggest that the impact of democracy and growth on human development varies depending on the levels of a country's economic development and democracy. The findings imply that the role of democracy in enhancing human development

should not be overemphasized particularly in the developing countries, and economic growth is vital in these countries. From the policy perspective, it is suggested that governments in the developing countries should focus on economic growth and development, and for the developed and democratic countries democracy plays much greater role in enhancing human development than economic growth.

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## Tables:

Table 1 Descriptive statistics

	HDI	RGDPPCg	GS	OPEN	DEMOP4	DEMOP4
Mean	0.608	0.037	12.663	77.683	5.044	7.020
Median	0.635	0.017	9.989	67.984	4.650	7.250
Maximum	0.941	3.554	65.803	432.740	10.000	10.000
Minimum	0.174	-0.256	1.668	1.546	1.000	2.000
Std. Dev.	0.182	0.225	8.680	49.022	3.115	2.150
Skewness	-0.353	9.226	2.154	2.085	0.232	-0.023
Kurtosis	2.162	107.457	8.814	11.310	1.695	1.792

### Panel Unit root test (Null hypothesis: panel series is non-stationary)

LLC t-statistics	-24.864	-506.581	-24.600	-6.061	-21.221	-126.168
Probability (LLC)	0.000	0.000	0.000	0.000	0.000	0.000
Observations	957	1131	1156	1156	1140	1015

Table 2 The impact of economic growth and democracy on Human development indicator for the period 1980-2010

	PLS (1)	PLS (2)	FE (3)	FE (4)	RE (5)	RE (6)
RGDPPCg	0.049** (2.307)	0.046*** (5.536)	-0.009* (1.820)	-0.005 (1.014)	-0.008 (1.071)	-0.005 (0.662)
lnGS	-0.041*** (4.596)	-0.053*** (4.596)	-0.014** (2.202)	-0.022*** (3.692)	-0.021** (2.136)	-0.029*** (2.871)
lnOPEN	0.056*** (7.393)	0.060*** (5.261)	0.091*** (14.148)	0.092*** (15.102)	0.085*** (10.362)	0.087*** (8.154)
DEMOP4	0.037*** (25.142)		0.007*** (4.592)		0.011*** (9.051)	
DEMOP4		0.054*** (17.645)		0.011*** (4.368)		0.014*** (5.744)
Constant	0.265*** (7.119)	0.066*** (3.214)	0.220*** (4.882)	0.188*** (4.252)	0.245*** (4.012)	0.196*** (3.576)
Adjusted R <sup>2</sup>	0.452	0.433	0.951	0.953	0.323	0.953
Wald test ( <i>p</i> -value)	0.000	0.000	0.000	0.000	0.000	0.000
Observations	922	857	922	857	922	857
Countries	172	154	172	154	172	154

*t*- statistics are in parentheses. \*\*\*, \*\*, \* indicate the level of significance at the 1%, 5% and 10%, respectively.

Table 3 The effect of economic growth and democracy on Human development indicator in developing countries for the period 1980-2010

	Developing countries				Developed countries			
	PLS				PLS			
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
RGDPPCg	0.122*** (7.185)	0.104*** (2.822)	0.190*** (3.823)	0.665*** (2.865)	-0.021*** (4.207)	-0.015*** (3.130)	-0.084** (1.959)	-0.037 (0.389)
lnGS	-0.037*** (6.653)	-0.056*** (9.322)	-0.036*** (6.646)	-0.057*** (9.124)	0.021*** (2.560)	0.009 (1.490)	0.020*** (2.747)	0.009 (1.513)
lnOpen	0.079*** (7.909)	0.071*** (8.483)	0.079*** (8.003)	0.069*** (8.164)	0.019*** (0.005)	0.033*** (5.074)	0.019*** (3.946)	0.033*** (5.129)
DEMOF	0.020*** (8.960)		0.021*** (9.907)		0.015*** (12.911)		0.014*** (14.094)	
DEMOP4		0.029*** (6.832)		0.030*** (8.252)		0.022*** (15.224)		0.022*** (19.871)
DEMOF*RGDPPCg			-0.021** (1.996)				0.007 (1.450)	
DEMOP4*RGDPPCg				-0.076*** (2.740)				0.002 (0.228)
Constant	0.194*** (7.956)	0.154*** (8.611)	0.190*** (7.750)	0.158*** (8.833)	0.562*** (11.570)	0.451*** (8.923)	0.566*** (12.477)	0.453*** (9.591)
Adjusted R <sup>2</sup>	0.250	0.269	0.250	0.283	0.333	0.312	0.332	0.309
Wald test ( <i>p</i> -value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	663	619	663	619	259	238	259	238
Countries	129	115	129	115	43	39	43	39

*t*- statistics are in parentheses. \*\*\*, \*\*, \* indicate the level of significance at the 1%, 5% and 10%, respectively.

Table 4 Impact of interaction effects on HDI at the minimum, mean and maximum levels of growth and democracy

Level	Developing country		Developed country	
	$\partial(\text{HDI})/\partial(\text{RGDPPCg})$ DEMOF= min, mean, max.	$\partial(\text{HDI})/\partial(\text{DEMOF})$ RGDPPCg= min, mean, max.	$\partial(\text{HDI})/\partial(\text{RGDPPCg})$ DEMOF= min, mean, max.	$\partial(\text{HDI})/\partial(\text{DEMOF})$ RGDPPCg= min, mean, max.
Minimum	0.168*** (4.310)	0.026*** (9.384)	-0.077** (2.019)	0.013*** (13.272)
Mean	0.104*** (10.806)	0.020*** (9.340)	-0.028*** (4.423)	0.015*** (12.271)
Maximum	-0.025 (0.417)	-0.027 (1.084)	-0.016*** (2.562)	0.038** (2.267)

*t*- statistics are in parentheses. \*\*\*, \*\*, \* indicate the level of significance at the 1%, 5% and 10%, respectively.

Table 5 Impact on HDI in autocratic, transition and democratic countries 1980-2010

	Autocratic countries		Transition countries		Democratic countries	
	(15)	(16)	(17)	(18)	(19)	(20)
RGDPPC <sub>g</sub>	0.255* (1.772)	0.268 (1.105)	0.155* (1.887)	0.578** (2.366)	0.003 (0.173)	0.061 (1.018)
lnGS	-0.066*** (3.291)	-0.066*** (3.281)	-0.079*** (6.109)	-0.078*** (6.049)	-0.043*** (2.680)	-0.042*** (2.567)
lnOpen	0.076*** (3.784)	0.076*** (3.771)	0.089*** (7.016)	0.088*** (6.900)	0.0002 (0.022)	-1.12E-05 (0.001)
DEMOF	-0.017* (1.751)	-0.017* (1.730)	0.028*** (6.579)	0.028*** (6.522)	0.044*** (18.729)	0.044*** (18.636)
DEMOF*RGDPPC <sub>g</sub>		-0.007 (0.069)		-0.083*** (1.837)		-0.007 (1.014)
Constant	0.385*** (3.465)	0.385*** (3.452)	0.175*** (2.965)	0.182*** (3.091)	0.475*** (9.475)	0.469*** (9.295)
Adjusted R <sup>2</sup>	0.178	0.173	0.370	0.375	0.497	0.497
Wald test ( <i>p</i> -value)	0.000	0.000	0.000	0.000	0.000	0.000
Observations	187	187	293	293	377	377
Countries	40	40	54	54	61	61