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THE EFFECT OF INDUSTRIAL, FINANCIAL, TECHNOLOGICAL AND ENVIRONMENTAL DEVELOPMENT INDICATORS ON THE DEMOCRACY LEVEL IN EMERGING ECONOMIES*

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The study investigates the effects of industrial production, high-technology exports, credit to private sector, and environmental industrialization indicators on the level of democracy in emerging markets. We tested the impact of industrialization indicators on the level of democracy with the dynamic panel data model and the panel ordered qualitative choice model that we used for the first time in the democracy literature. We obtained similar results from both dynamic panel data analysis and ordered qualitative choice model analysis. We conclude that economic development raises the level of democracy and is more effective at higher levels of democracy.

Keywords: Democracy, Economic Development, Dynamic Panel Data Analysis, Ordered Qualitative Choice Models
JEL Classification: F59, O10, C33, C19

1. INTRODUCTION

The relationship between democracy whose formation goes back to the 11th and 12th centuries B.C. and economic development and the direction of this relationship is an indisputable fact. In its simplest definition, democracy refers to the self-government of people. Every country has a different level of democracy, and the democracy levels of countries are measured by various indices. These are; i) Indices developed by authors such as Arat Democracy Index, Banks Democracy Index, Bollen Liberal Democracy

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Index, Poe and Tate Democracy Index, Vanhannen Index; ii) Indices developed by international institutions and organizations such as Polity Index and Freedom House Index. The indices except for the Polity Index and Freedom House Index are very old indices. The Freedom House Democracy Index, which is well known and also the most commonly used index in all studies, will be used in this study. The index ranks the level of democracy from 1 to 7 based on political rights and civil liberties, and classifies countries as "free", "partly free" and "non-free". In its simplest definition, economic development, is an increase in the welfare level of people. In terms of economic development, the development level of each country is different, and the development levels of the countries can be measured in various ways. Economic development is basically measured by per capita income, purchasing power parity, physical quality of life index and human development index. On the other hand, in a narrow sense, development is associated with industrialization. In this context, industrialization is among the main objectives of development economics, and it plays a pivotal role in the development processes of countries. The relationship between industry and development is remarkable in the economics literature.

The relationship explored by both political scientists and economists has yielded complex results. While more studies focus on the tendency from democracy to economic development in the democracy-development literature, studies reconcile with the tendency from economic development to democracy. The relationship between democracy and economic development was first examined by Lipset (1959). Lipset examined the effect of economic development on democracy and concluded that the effect of economic development on democracy was positive. According to him, 'the better the economic situation of a country, the higher the chances of maintaining democracy'. After Lipset (1959), this relationship has been examined by many researchers.

The relationship between democracy and economic development is always one of the areas of interest in economics. It is generally accepted in the economics literature that resources are used more effectively in countries with developed democracy. In this respect, it will be important in international economics to examine the relationship between democracy and economic development econometrically in emerging market economies and to make an inference from the results. It is accepted in the literature of democracy-development relationship that an emerging economy also increases democracy. This study aims to analyze the impact of economic development on democracy in emerging economies. In the study, we make various contributions to the literature: First, we have addressed the emerging market economies because the studies analyzing the impact of economic development on democracy in emerging market economies are limited in numbers. We took into account the current developments in the world economy, especially in the definitions of the variables and the variables used in this study were not included in the previous studies. Second, although economic development is generally measured by per capita income, purchasing power parity, physical nature index of life and human development index, we defined the development

with industrialization, and financial, technological, and environmental factors from a modern perspective in our study. Third, we applied a new method, which has not been used before in the economic development and democracy literature, using the ordered qualitative choice model. Fourth, we carried out two separate analyses by benefitting from dynamic panel data and panel ordered qualitative choice models, and we analyzed whether the results overlap each other. We investigated the effect of industrialization and industrial production, which are developed as a result of technological innovation and exports, and environmental indicators on democracy level.

The study consists of five sections. The remaining part after the introduction is as follows: Section 2 provides information regarding the literature, Section 3 describes the data set, model and method, Section 4 contains empirical analysis, Section 5 presents the result of the study.

2. LITERATURE REVIEW

There are many studies investigating what kind of relationship there are between democracy and economic development. While most studies show that democracy has an impact on economic development, there are also studies revealing that the impact of economic development on democracy is possible. In addition, there are also studies focusing on the mutual relationship between democracy and economic development and indicating no relationship between democracy and economic development. While the studies indicate that the relationship is complicated, there is a consensus that there is a relationship from economic development to democracy in the literature reviewed. However, we see that there are more studies examining the effect of democracy on economic development, which are also controversial.

The first study on democracy and economic development belongs to Lipset (1959), it is known as the 'Lipset Hypothesis'. According to the hypothesis, the prerequisite for ensuring democracy is economic development. From this point of view, we present the literature that examines the effect of economic development on democracy based on the Lipset hypothesis in our study. Empirical studies previously based mostly on simple correlation analysis (Cutright, 1963; Neubauer, 1967; Olsen, 1968). Over the years studies started to include cross-section (Jackman, 1973; Bollen, 1979; Bollen and Jackman, 1985), and then panel data analysis (Barro, 1996; Acemoğlu et al., 2008; Che et al., 2013). While researchers developed their own measures of democracy in the early stages as a measurement of democracy (Cutright, 1963; Neubauer, 1967; Jackman, 1973; Bollen, 1979; Arat, 1988), in recent years democracy measures have started to be based on the Freedom House and Polity databases which have been created by institutions (Helliwell, 1992; Barro, 1996; Londregan and Poole, 1996; Barro, 1999; Acemoğlu et al., 2008; Benhabib et al., 2013). While the variables such as industrialization, education and urbanization, and then per capita energy consumption were used as a measure of economic development (Cutright, 1963; Neubauer, 1967; Olsen, 1968; Jackman, 1973;

Bollen, 1979; Arat, 1988), per capita income has started to be used in recent years (Bollen and Jackman, 1985; Helliwell, 1992; Barro, 1996; Acemoğlu et al., 2008).

It becomes obvious that economic development and growth affect democracy positively in accordance with the results of the studies in the literature investigating the effect of economic development and growth on democracy (Arat, 1988; Bollen, 1979; Colaresi and Thompson, 2003; Cutright, 1963; Jackman, 1973; Lipset, 1959; Olsen, 1968; Pourgerami, 1988; Robinson, 2006; Balaev, 2014; Ranganathan et al., 2015; Barro, 1999; Heid et al., 2012; Londregan and Poole, 1996; Moral-Benito and Bartolucci, 2011; Benhabib et al., 2013; Che et al., 2013). Only a few studies indicate a negative impact of economic development and growth on democracy (Kim, 1971). Lipset (1959) examined the relationship between democracy and economic development by using a statistical analysis method with data belonging to the time period of the 1950s for 48 countries. It comes to the fore that economic development is higher in unstable dictatorships than in stable ones in some countries, while it is higher in stable democracies than in unstable democracies. In his study titled 'National Political Development: Measurement and Analysis', Cutright (1963) analyzed the relationship between democracy and economic development for 77 countries in the 1960 period by using correlation and cross-section analysis. He used the political development index which was created by himself as a measure of democracy. He concludes that political development is highly related to economic development. Olsen (1968) analyzed the relationship between democracy and economic development by using the correlation and cross-section analysis. He used seven political development indices as an indicator of democracy and socioeconomic development as an indicator of economic development. He concludes that political developments are strongly explained by socioeconomic developments. Kim (1971) tested the relationship between democracy and economic development by using the cross-section analysis. He used Neubauer's democratic development index as an indicator of democracy and concluded that socio-economic factors were insufficient for political democracy. Jackman (1973) examined the relationship between democracy and economic development by using the cross-section analysis. He used his own democratic performance index as an indicator of democracy. According to results of the study, there is a nonlinear but positive relationship between democratic performance and economic development. Bollen (1979) tested the relationship between economic development and democracy for the period 1960-1965 by using the economic development timing variable with the cross-section analysis and obtained the result that economic development had a significant and positive effect on democracy. Arat (1988) examined the relationship between democracy and economic development with the cross-section, panel data and time series analysis method. He used his own index based on political participation, competition and civil liberties as an indicator of democracy. Economic development had a nonlinear positive effect on democracy. Pourgerami (1988) tested the relationship between economic development and democracy with the cross-section analysis by using the democracy measure based on the political pressure index of Berg-Schlosser as an indicator of democracy. The impact of economic development on

democracy is positive. Londregan and Poole (1996) examined the relationship between democracy and income with panel data analysis for the period 1952-1985 in 100 countries. Per capita income is an important factor that promotes the emergence of democratic institutions. Barro (1999) examined the relationship between democracy and economic growth by using the panel data analysis. He utilized the variable of improvement of living standards as an indicator of economic growth in the study. According to the study improvement of living standards increases the level of democracy. Colaresi and Thompson (2003) analyzed the relationship between economic development and democracy by using the panel data analysis. Economic growth strengthens democracy. Robinson (2006) tested the relationship between economic development and democracy for 193 countries in the period 1970-1995 by using time and cross-section analysis and obtained the result that economic development and democracy were related to each other. In the study conducted by Moral-Benito and Bartolucci (2011), the relationship between democracy and income was tested for 137 countries in the period 1960-2000 with the panel data analysis and it was obtained that the per capita income had a non-linear but significant positive effect on democracy. Heid et al. (2012) examined the relationship between democracy and income by using the panel data analysis. They conclude that the per capita income level has a significant and positive effect on democracy, according to the data obtained from the study where the data from the period 1960-2000 were used for 150 countries. Benhabib et al. (2013) examined the relationship between democracy and income for 184 countries in their study titled 'Income and Democracy: Evidence from Nonlinear Estimations'. The panel data analysis was applied by using the Polity IV democracy index Polity II, Freedom House democracy index political rights index, Vanhanen House democracy index as an indicator of democracy in the study in which data from the 1960-2000 period was used. There is a statistically significant positive relationship between per capita income and democracy. Che et al. (2013) tested the relationship between democracy and income with the panel data analysis by using Freedom House, Polity IV and Bollen democracy index as an indicator of democracy. It is concluded that per capita income has a positive and significant effect on democracy. Balaev (2014) examined the relationship between democracy and economic development with the panel data analysis. In his analysis for 80 countries with the data for the period 1960-2008, he used four different democracy indices: Freedom House, Polity IV democracy index, Vanhanen democracy index, and Combined democracy index. Economic development has a positive effect on democracy. Ranganathan et al. (2015) tested the relationship between democracy and economic development with the statistical analysis method and conclude that if countries have a low development level, they are trapped in democracy. Knutsen et al. (2018a) examined the relationship between democracy and economic development by using the OLS method. According to the results of the study, the impact of economic development on democracy is positive. Knutsen et al. (2018b) analyzed the relationship between democracy and economic development by using the OLS method. They used four varieties of democracy as an indicator of democracy. They conclude that economic

development has a positive effect on democracy. Chisadza and Bittencourt (2019) examined the relationship between democracy and economic development with panel data analysis for the period 1960-2010 in Sub-Saharan Africa. They concluded that economic development has a positive and significant effect on democracy. Zirari and Souar (2019) tested the relationship between democracy and economic growth for Algeria in the period 1999-2018 by using Granger causality analysis and obtained the result that the study promotes the Lipset Hypothesis.

3. RESEARCH DESIGN

3.1. Data

The study analyzes the impact of economic development on democracy in accordance with Septh (1994)'s definition of development. We moved from Septh's (1994) definition of modern development. According to Septh's (1994) definition of modern development, economic development refers to environmental factors as well as economic, social and institutional factors.

Table 1. Variables and Resources

Variable Type	Variable	Description	Source
Dependent Variable	DEM	It is a measure of democracy and is based on the political rights index of the Freedom House democracy index. In the dynamic panel data analysis, the index with the highest value 1 and the lowest value 7 was rescaled in the range of 0-1. In panel ordered qualitative choice models, it was scaled in three level categories as low, medium and high.	Freedom House[1]
Independent Variable	DCPB	Domestic credit to private sector by banks (% GDP)	WDI[2]
	IP	Industrial production (% GDP)	WDI
	LNIP	Industrial production (constant 2010 US$)	WDI
	HTEX	High-technology exports (% manufactured exports)	WDI
	LNENERGY	Renewable energy	OECD[3]

Based on the Septh's (1994) development definition, we defined the economic

[1] https://freedomhouse.org.

[2] World Development Indicator: https://databank.worldbank.org/data.

[3] Organisation for Economic Co-operation and Development: https://data.oecd.org/energy/renewable-energy.htm.

development with industrialization, technological, financial and environmental factors. We functionally expressed the economic model that we created in the study as follows:

$$DEM = f(IP, DCPB, HTEX, ENERGY). \quad (1)$$

DEM shows the level of democracy. IP refers to industrial production and is used as an industrialization indicator, HTEX refers to high-technology exports and is used as a technology indicator, DCPB refers to credit to private sector by banks and is used as a financial indicator, ENERGY refers to renewable energy and is used as an environmental indicator. We aim to investigate the impact of industry, financial, technological and environmental development indicators on democracy. We analyzed the effect of economic development on democracy with the understanding of modern development in the model.

In this study, we investigated the effect of economic development on democracy by using the data from 2001-2016 period for 24 emerging market economies. We used the democracy index as a dependent variable, and industrial production, credit to private sector by banks, high-technology exports as well as renewable energy variables as independent variables.

The variables used in the research, the explanation of the variables and the resources obtained are presented in Table 1 above.

3.2. Model

The econometric model that we created for dynamic panel data analysis is as follows:

$$DEM_{it} = \alpha + \beta DEM_{it} + \gamma IP_{it} + \pi DCPB_{it} + \mu HTEX_{it} + \rho LNENERGY_{it} + \delta_i + \theta_t + u_{it}. \quad (2)$$

In the model "i" stands for a country; "t" stands for a time; "α" stands for a constant term; "$\beta, \gamma, \pi, \mu, \rho$" stands for estimation coefficients; "δ_i" shows unit constant effects, "θ_t" shows time constant effects, "u_{it}" stands for an error term. DEM_{it} shows the level of democracy. The democracy index is based on the political rights index of Freedom House, and its highest value is 1 and lowest value is 7. We converted this index into 0-1 range where 0 shows full autocracy and 1 shows full democracy. We applied logarithmic transformation. IP refers to industrial production, $DCPB$ refers to credit to private sector by banks, $HTEX$ refers to high-technology exports and $ENERGY$ refers to renewable energy. We also used the lagged value of democracy in the model. Because democracy has a permanent quality over time, it is a common practice in the literature to include the lagged value of the democracy variable among the independent variables. The lagged value of democracy is included in the models because it maintains the continuity of democracy and reflects potentially averaging dynamics in democracy (the tendency of the democracy score to return to a certain equilibrium value for the country).

The panel model that we created for ordered qualitative choice analysis is as follows:

$$DEM_{it} = \alpha + \gamma LNIP_{it} + \pi DCPB_{it} + \mu HTEX_{it} + \rho LNENERGY_{it} + \varepsilon_{it}. \quad (3)$$

In the model, DEM_{it}shows the level of democracy. The democracy index we used is based on the political rights index of Freedom House and its highest value is 1 and lowest value is 7. We divided this index into three categories: low, medium and high democracy level. When categorizing, we first reversed the democracy index with the highest value being 7 and the lowest value being 1. We showed it at three levels, from low-level democracy to high-level democracy (1 to 3). Level 1 is low level democracy, level 2 is medium level democracy and level 3 is high level democracy. *IP* refers to industrial production, *DCPB* refers to credit to private sector by banks, *HTEX* refers to high-technology exports and *ENERGY* refers to renewable energy.

As will be noted, while using the lagged value of democracy in the model we created for dynamic panel data analysis, we did not use the lagged value of democracy in the model we created for panel-ordered qualitative choice analysis. Since the lagged value used in the dynamic model was not used in the ordered qualitative choice model, we created separate models.

3.3. Method

In the study, we used dynamic panel data analysis and ordered qualitative choice models as econometric method and carried out two separate analyses. Dynamic panel data analysis is used more in research because it allows stronger estimations for situations such as the problem of internality, heteroscedasticity, and autocorrelation. In dynamic panel data analysis, especially GMM tests, which are two different tests (Difference Generalized Method of Moments (difference-GMM) and System Generalized Method of Moments (system-GMM)), are mostly preferred. Also, it is appropriate to use the highest likelihood method when the dependent variable is a categorical and ordered variable in econometric models. Because applying OLS to categorical ordered data can cause insignificant estimations between ordered and categorical dependent variable values. The democracy index based on the political rights we used as a dependent variable is a discrete variable that takes values between 1 and 7 integers. Since the democracy index is both a categorical and an ordered variable, it would be more appropriate to use the ordered logit/probit probability estimation method.

Democracy dependent variable has an ordered and categorical quality. Ordered logit/probit models were used to estimate categorical and ordered variables. In the democracy-development literature, the panel data analysis, which is mostly based on OLS, is used, and the democracy index is used by converting the range of 0 and 1. In addition, we also made ordered logit model estimation, which is more suitable for explaining the variable, since the democracy variable has an ordered and categorical character. On the one hand, we aimed to contribute to the literature with ordered logit estimation based on the highest likelihood. On the other hand, we tried to determine whether the estimations made with the ordered logit model match the system GMM

estimations from the panel data analysis.

4. RESULTS

We estimated the model with four different types of this method in order to see which dynamic panel data analysis yielded healthier results. In Table 2, we see the results of the dynamic panel data analysis.

Table 2. Dynamic Panel Data Estimation Results

Independent variables	Model (Dependent Variable DEM)			
	Pooled OLS	Fixed Effect OLS	Difference-2 GMM	System-2 GMM
DEML1	0.955***	0.619***	0.505***	0.707***
	(0.018)	(0.077)	(0.147)	(0.053)
	[0.000]	[0.000]	[0.001]	[0.000]
IP	0.0005	-0.002	-0.002	0.002***
	(0.0006)	(0.001)	(0.001)	(0.0009)
	[0.368]	[0.118]	[0.193]	[0.016]
HTEX	-0.00001	0.0007	0.0007	-0.0001
	(0.0001)	(0.001)	(0.001)	(0.0004)
	[0.928]	[0.474]	[0.546]	[0.760]
DCPB	-0.0001	-0.0003	-0.0003	-0.0005***
	(0.0001)	(0.0003)	(0.0003)	(0.0002)
	[0.228]	[0.307]	[0.345]	[0.013]
LNENERGY	-0.002	-0.003	0.005	0.018***
	(0.001)	(0.016)	(0.022)	(0.004)
	[0.158]	[0.857]	[0.817]	[0.000]
F/Wald χ^2	921.46	82.12	42.13	6485.16
	[0.0000]	[0.0000]	[0.000]	[0.000]
AR(1)			-1.51 [0.130]	-1.51 [0.30]
AR(2)			-0.69 [0.492]	-0.68 [0.499]
Sargan Test			13.23 [0.430]	15.16 [0.233]
Hansen Test			13.06 [0.443]	5.70 [0.930]
Fark Hansen			3.92 [0.417]	0.84 [0.359]
R^2	0.93	0.99		
Observations	360	360	336	360
Countries	24	24	24	24
Instruments			18	17

Notes: We used robust standard errors in all analyses. We also made a finite sample correction suggested by Windmeijer (2005) in difference GMM and system GMM estimations. Numbers in parentheses are standard errors, numbers in square brackets are probability values. ***, ** and * signs show statistical significance at the 1%, 5% and 10% levels. In difference GMM and system GMM estimations, we limited the number of the instrument, taking into account the rule that the number of the instrument should not exceed the number of units.

The analysis results of the model reveals that while the lagged dependent variable of democracy is statistically significant in the pooled OLS estimation, industrial production, credit to private sector by banks, high-technology exports and renewable energy variables are statistically insignificant. This shows that democracy is largely explained by the previous level of democracy and that economic development does not affect democracy. However, since the correlation between the lagged value of the dependent variable and the error term in the model disrupts the strict externality assumption, we obtain deviative and inconsistent results for parameter estimators.

In the fixed effects estimation, we find that the lagged democracy variable is statistically significant at the 1% level and other variables are insignificant. So, we can say that the level of economic development does not affect democracy. Also, since there is a correlation between the lagged value of the dependent variable and the error term, the results for parameter estimations are deviated and inconsistent.

According to the two-stage difference GMM estimation results, the autoregressive coefficient is below the lower limit and statistically significant at the 1% level. This indicates that there is a downward deviation and the system GMM estimator should be preferred instead.

Deciding to continue the analysis with the system GMM, we applied the two-stage system GMM method because the two-stage estimation method is more effective than the one-stage estimation method. According to the Wald test statistics, which is estimated to ensure the validity of the system GMM, the model is statistically significant at the 1% level. According to the AR(1) and AR(2) test results, there are no first and second order autocorrelation problems, and the instrument variables used as a result of the Sargan and Hansen tests are valid. In addition, according to the Difference Hansen test result, there is no internality problem. We see that the most important determinant of democracy is its lagged value. Furthermore, the lagged value of democracy is 0.707, which indicates that democracy is quite permanent over time and shows that it is significant at the 1% level. Industrial production, which shows the level of economic development, positively affects democracy and has a significance at the 1% level. Increasing one unit of industrial production increases democracy by 0.006 points. Although the effect of industrial production on democracy is small, we determined that this effect can only be in the long term. While the effect of credit to private sector by banks on democracy is negative but significant at the 1% level and the impact of renewable energy on democracy is positive and significant at the 1% level, we could not detect any relationship between high-technology exports and democracy.

We estimated both models to decide which ordered logit and ordered probit models, which are ordered qualitative choice models, to be used in our analysis. In Table 3, we see the results of the compared ordered logit and probit democracy models, which are ordered qualitative choice model.

While ordered logit and probit models are very similar to each other, there are several criteria regarding the preference of the models in the literature. It can be decided according to the information criteria (AIC and BIC) and pseudo R^2 that emerge as a

result of the analysis. Accordingly, the information criteria in the ordered probit model are higher than the information criteria in the ordered logit model and are smaller in terms of pseudo R^2 values. Therefore, it would be appropriate to select the ordered logit model according to these criteria.

Table 3. Comparison of Ordered Logit and Probit Democracy Models

Model	Ordered Logit Model	Ordered Probit Model
LNIP	1.551***	0.915***
DCPB	-0.026***	-0.015***
HTEX	-0.001	0.0003
LNENERGY	0.195***	0.105**
McFadden R^2	0.161	0.158
AIC (Akaike information criterion)	549.563	551.291
BIC (Bayes information criterion)	573.267	574.995
Log likelihood	-268.782	-269.645
LR statistics	102.935	101.208
Prob.(LR)	0.000	0.000
Observations	384	384

Notes: ***, ** and * signs show statistical significance at the 1%, 5% and 10% levels.

Table 4. Ordered Logit Model Estimation Results

Dependent Variable: DEM				
	1.Low Level	2. Medium Level	3. High Level	
	Observations (N) = 384		LR chi2 (4)=102.94	
	Log Likelihood = -268.78156		Prob>chi2=0.0000	
	Pseudo R^2 = 0.1607			
Independent variables	Coefficient (β)	Standard Error	z	P>|z|
LNIP	1.551***	0.185	8.38	0.000
DCPB	-0.026***	0.004	-6.52	0.000
HTEX	-0.001	0.007	-0.15	0.880
LNENERGY	0.195***	0.081	2.41	0.016
μ_1	13.907	2.063		
μ_2	14.611	2.077		

Notes: μ's show cut points (end values). ***, ** and * signs show statistical significance at the 1%, 5% and 10% levels.

The most important assumption is to provide the parallel regression assumption in

order to determine whether ordered logit models give correct estimation. If this assumption is violated, the results obtained from the ordered logit model estimations will not be reliable, and therefore it will be appropriate to use generalized ordered logit models in which the parallel regression assumption is not sought. Based on this, we first estimated the ordered logit model, then we conducted the parallel regression assumption test, and then made the estimation of the generalized ordered logit models according to the results. In Table 4, we present the ordered logit estimation results. Among the independent variables, industrial production, credit to private sector by banks and renewable energy variables are significant at the 1% level, but high-technology exports are insignificant. Besides, the model has two cutting points and according to the value of Prob> chi2 = 0.0000, we see that the model is significant as a whole and is suitable. In addition, Pseudo R^2 = 0.1607 shows the goodness of fit in the model and therefore 16.0% of the total change in the dependent variable can be explained by the independent variables in the model.

After making ordered logit model estimation, we performed parallel regression assumption test.

Table 5. Parallel Regression Assumption Test

Variable	Chi-Square	P> Chi-Square	Degrees of Freedom
All Model	20.76	0.000	4
LNIP	10.30	0.001	1
DCPB	1.36	0.243	1
HTEX	6.91	0.009	1
LNENERGY	8.37	0.004	1

We used the Brant Test put forward by Brant (1990) for the parallel regression assumption. For this purpose, we did the parallelism test both for the overall model and for all independent variables separately. Test statistics are shown in Table 5.

We obtained the value of 20.76 for all model from the Brant test statistics at 4 degrees of freedom. The chi-square table value is 9.488 at the 5% significance level. Accordingly, when we compare the test statistics found with the Chi-Square table value with 5% significance level, the result obtained is 9.488 < 20.76. We see that the H_0 hypothesis is rejected and the parallel regression assumption is violated. In addition, the H_0 hypothesis cannot be rejected for the independent variable of the credit to private sector by banks in the parallel regression assumption, but we can say that the parallel regression assumption is violated because all model will be taken into consideration. Therefore, we decide that the estimation results obtained from the ordered logit model will not be reliable, and we consider it appropriate to estimate the generalized ordered logit model. When we examine Table 5 in detail in terms of variables, we see that while the credit to private sector by banks provides parallel assumptions, industrial production,

high-technology exports and renewable energy variables violate parallel assumptions. In this case, it is recommended to use the Partial Proportional Odds Model in cases where the assumption of parallelism is provided in some of the variable coefficients and not provided in some of them. For this reason, we used the partial proportional odds model which is a special type of generalized ordered logit model in our study. In the model, we restrained the variables and tested whether they provide the assumption of parallel lines. It is done with the Wald test developed by Brant (1990). According to the Wald test obtained as a result of the test, it is checked whether the model violates the assumption of parallel lines (Williams, 2006, p.64). In this regard, we applied the Brant's Wald test to other variables except for the variables which do not provide parallelism and we concluded that the variables provide the assumption of parallel lines with the value $\chi^2 = 3.70$; $p > 0.05$ and that the partial proportional odds model created is also significant with a value of $\chi^2 = 106.69$; $p < 0.01$. Our results are presented in Table 6.

Table 6. Partial Proportional Odds Model Estimation Results

	Category Comparison for Democracy Level	Dependent Variable: DEM 1.Low Level 2. Medium Level 3. High Level Observations (N) = 384 LR chi2 (4)=106.69 Log Likelihood = -266.90556 Prob>chi2=0.0000 Pseudo R^2 = 0.1666				
		Independent Variables	Coefficient (β)	Standard Error	Odds Ratio	z	P>|z|
Comparison 1	Against Category 1, Category 2 and 3 (1x2-3) (Comparison 1) Medium and High Level Democracy Against Low Level Democracy	IP	1.542***	0.185	4.674	8.71	0.000
		DCPB	-0.024***	0.004	0.975	-6.18	0.000
		HTEX	-0.001	0.010	0.998	-0.23	0.817
		LNENERGY	0.100	0.096	1.105	1.05	0.294
Comparison 2	Against Category 1 and 2, Category 3 (1-2x 3) (Comparison 2) High Level Democracy Against Low and Medium Democracy	LNIP	1.542***	0.185	4.674	8.71	0.000
		DCPB	-0.024***	0.004	0.975	-6.18	0.000
		HTEX	-0.001	0.010	0.998	-0.23	0.817
		LNENERGY	0.258***	0.089	1.295	2.92	0.004

Notes: ***, ** and * signs show statistical significance at the 1%, 5% and 10% levels.

We can say that the coefficients of the industrial production, the credit to private sector by banks and the high-technology exports variables do not differ according to the categories of the dependent variable, that is to say, they provide the assumption of parallel lines. In the study, category 1 shows low level democracy, category 2 shows medium level democracy, category 3 shows high level democracy. According to the

results of (1x2-3) partial proportional odds model which we obtained by comparing the first level with the second and the third level from the level of democracy in Table 6, it becomes clear that while high-technology exports and renewable energy independent variables are insignificant to statistically explain the first or low democracy level, industrial production and the credit to private sector by banks, which are the variables except these variables, are statistically significant. According to the results of the (1-2x3) partial proportional odds model where the first and the second level are compared with the third level from democracy levels, all independent variables except high-technology exports are statistically significant in explaining the level of democracy at the 1% level.

In our study, our expectation of the coefficient sign of our variables is positive for all variables. According to the results of (1x2-3) partial proportional odds model, the credit to private sector by banks and high-technology exports are negative. We can say that these variables support the possibility of a lower level of democracy for the medium and high level of democracy versus the low level of democracy. In other words, credit to private sector by banks and high-technology exports have a negative effect on the level of democracy. Other independent variables except these variables have an increasing effect on the level of democracy. According to the results of (1-2x3) partial proportional odds model, the credit to private sector by banks and high-technology exports are negative. We see that the credit to private sector by banks and high-technology exports variables support the possibility of a lower level of democracy for the high level of democracy versus the low and medium level of democracy. In other words, credit to private sector by banks and high-technology exports have a negative effect on the level of democracy. However, we should not ignore that high-technology exports, which are negative in terms of signs, are statistically insignificant. Industrial production and renewable energy variables, which are other independent variables except these variables, have an increasing effect on the level of democracy.

When we look at the coefficient and odds ratios for the model, we can interpret the coefficients as follows:

Category comparison for 'Medium and High-Level Democracy' against 'Low Level Democracy' (versus 1st category, 2nd and 3rd category: Comparison 1): In this comparison, we interpret how the independent variables in the 2nd and 3rd categories increase or decrease the odds compared to the 1st category group. Accordingly, we can interpret significant variables that affect the level of democracy. Among the variables that affect the level of democracy, industrial production and credit to private sector by banks are significant. Industrial production is 4.674 times more likely to affect the level of medium and high-level democracy versus low level democracy. Credit to private sector by banks is 0.975 times less likely to affect the level of medium and high-level democracy versus low level democracy.

Category comparison for 'High Level Democracy' against 'Low and Medium Level Democracy' (against 1st and 2nd category, 3rd Category: Comparison 2): In this comparison, we interpret how independent variables in 3rd category increase or decrease

the odds compared to 1st and 2nd category group. Accordingly, we can interpret significant variables that affect the level of democracy. Among the variables that affect the level of democracy, industrial production, credit to private sector by banks, and renewable energy variables are significant. Industrial production is 4.674 times more likely to affect the high level of democracy versus low and medium level democracy. Credit to private sector by banks is 0.975 times less likely to affect the high level of democracy versus low and medium level democracy. Renewable energy is 1.295 times more likely to affect the high level of democracy versus low and medium level democracy. The reason why the coefficient sign of the credit to private sector by banks did not come out as we expected might be because of the political effect. It might also be because of the effect of the financial system not developed sufficiently in emerging market economies, the effect of the public on the financial markets through central banks and incentive policies, the effect of non-rational diverting credit to the sector and / or social classes (people) through public policies.

In logit models, it is not sufficient to interpret the coefficients in terms of their statistical significance and signs. For this, we also need to show the effects of the dependent variable on the probability distribution and how the values of the independent variables change. This can only be done by calculating probability values and marginal effects with the help of coefficients.

Table 7. Marginal Values of Variables

Variable	High Level Democracy
LNIP	0.3040
DCPB	-0.0040
HTEX	-0.0003
LNENERGY	0.0510

The marginal effects of each independent variable are shown in Table 7. The marginal effects we estimated show only the marginal effects of the dependent variable on the highest category of democracy. Accordingly, the marginal effect of the industrial production variable increases the probability of the highest category regarding the level of democracy of this variable by 0.304 units. The marginal effect of the credit to private sector by banks reduces the probability of the highest category regarding the level of democracy of this variable by 0.004 units. The marginal effect of the renewable energy variable increases the probability of the highest category regarding the level of democracy of this variable by 0.051 units.

5. CONCLUSION

In the study, we empirically investigated the effects of economic development on democracy in separate analyses. In the analysis, we conducted dynamic panel data and ordered qualitative choice analysis, by using the data from the period 2001-2016 for 24 countries. We used the Freedom House democracy index as a democracy indicator, and we used industrial production as an industrialization indicator, high-technology exports as a technological development indicator, credit to private sector by banks as a financial development indicator, renewable energy as an environmental development indicator. We analyzed the effect of economic development on democracy with dynamic panel data analysis such as pooled OLS, fixed effects estimator, difference GMM, system GMM and ordered qualitative choice models (ordered logit model).

According to the results of the analysis, other variables except for the high-technology exports, which are among the development indicators, are statistically significant. While the sign of industrial production and renewable energy is in the expected direction, the sign of the credit to private sector by banks, which is financial development indicator, does not occur in the way we expected. Accordingly, industrial production increases the probability of the highest category regarding the level of democracy. The effect of credit to private sector by banks on democracy is negative and reduces the probability of the highest category regarding the level of democracy. The effect of renewable energy on democracy is positive and increases the probability of the highest category regarding the level of democracy.

In the emerging market economies, where there is no relationship between high-technology exports and democracy, a positive relationship was expected between high-technology exports and democracy. However, the variable is not in the desired direction and statistically significant in the model. The low share of high-technology exports in emerging countries may lead to an insignificant relationship between high-technology exports and democracy in question. For countries exporting high-tech products, it is possible that the variable in question is significant.

When we evaluate the results of the study as a whole, it is healthier to consider the results of models estimated by the two-stage system GMM method in order to give more reliable results by taking into account problems such as heteroscedasticity, autocorrelation, and internality from dynamic panel data analysis. Accordingly, the impact of economic development on democracy is positive. The effect of development on democracy is statistically significant. According to the estimation results obtained with the partial proportional odds model, which are among the ordered qualitative choice models, we can say that development at higher levels of democracy is more effective on democracy. While the probability of economic development affecting democracy at the medium and low levels of democracy is low, it is highly likely to affect the high level of democracy. To put it differently, the effect of economic development on democracy at the medium and low levels of democracy is lower than the level of high democracy.

The study shows that the standard of democracy can increase when industrialization,

production and export are realized with advances in technology, environmental quality level is improved and financial deepening is achieved with credit provided to private sector in emerging market economies. As the basic condition of economic development is production, industrial production of countries increases democracy in close relation with their development, including changes in economic, political, social and society fields. The increase in the industrial level has also been reflected in the development levels of the countries and shows a positive effect on democracy in the emerging market economies.

Energy is one of the basic economic development indicators of the countries. However, the excessive use of non-renewable energies (coal, petroleum, natural gas, nuclear), damage to the environment and human health, and instability in prices have led countries to renewable energy (solar, wind, geothermal, hydroelectric, biomass, wave energy). For this reason, many countries have come under the obligation to switch from fossil fuel-based development policy to renewable energy development policy. Emerging market countries are also among the countries with rising democracy standards, which have led progress in the field of renewable energy.

On the other hand, there is an inverse relationship between credit to private sector and the level of democracy. This shows both that public power is exercised irrationally to direct funds to investments and that financial deepening is not sufficiently provided in emerging markets. Public tenders lead to financial deepening, according to the observation of multi-partner companies and publicly capital traded companies in emerging markets. As a result of all this, the standard of democracy rises.

As a result, we can say that; the results overlap each other according to our analysis done with the dynamic panel data and panel ordered qualitative choice models.

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