






## Impact of democracy on literacy rate: A cross country study

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### ARTICLE INFO

#### Article history:

Received 17 November 2020

Received in rev. form 03 Dec. 2020

Accepted 07 December 2020

#### Keywords:

Literacy rate, Electoral Process,  
Pluralism Index,  
Government Index, Political  
Participation Index, Political Culture  
Index, Civil Liberties Index.

#### JEL Classification:

M10, M15

### ABSTRACT

*This study investigates the impact of democracy indices on the literacy rate. Panel Data of 134 Countries from 2007-2018 were collected from the website the World Bank and Gapminder. This study uses Ordinary Least Square (OLS), Pooled Ordinary Least Square (POLS), Driscoll-Kraay (DK), Second Stage Least Square (2SLS), Generalized Methods of Moments (GMM) methods. This research has found that political participation index and political culture index has a significant positive relationship with literacy rate in all the method. The functioning of government index has a significant positive relationship and electoral process and pluralism index has a significant negative relationship with literacy rate in all the methods except the GMM method. The civil liberties index has a significant negative relationship with literacy rate in POLS and in the other models, there is no significant relationship between the civil liberties index and literacy rate.*

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## Introduction

Education encourages democracy so people can make informed choices on elections, and is thus a pillar of a healthy and prosperous society Lipset (1959). If autocracy is the tyranny of the rich, then the poor and middle class may define democracy as tyranny. Because schooling is the only way for parents to boost their children's chances of a prosperous life (Keefer et al. 2004), democracy will achieve a country's educational standard (Besley et al. 2006).

Literacy is seen as an important contribution to socio-economic development. A country's economic success relies largely on the natural capital it possesses, and human resources are an important aspect of economic resources. Ample school infrastructure continues to improve the rate of literacy and is one of the main components of benchmarks for human growth. A family's socio-economic status has much to do with the level of literacy of a child and the level of literacy has to do with employment. The higher the income of the household, the more likely it is that the children will have a high degree of literacy, that is to say, while analphabetism does not cause poverty, poverty causes illiteracy (Street, 1995).

Lake and Baum (2001) explain how democratic political rivalry creates political forces that enhance the delivery of public services at the cost of rentals from members. Autocratic governments, on the other hand, will gain large rents by limiting such facilities without having to face significant consequences. Bueno de Mesquita et al. (2003) offers a somewhat different case for why liberalism broadens access to and raises support for education. They argue that broad-based school programs should be described as public goods, and that engaging in these programs is a cost-effective way of preserving electoral support for leaders with big "competitive coalitions" (as in democracies), and comparatively costly for leaders with tiny coalitions (as in many autocracies).

Acemoglu and Robinson (2006) also claim that the comparatively poor majority will press for free education under democracy (where they have more political power), while autocratic leaders will reject these costly educational programs that favor non-elites as well (see also Meltzer and Richards, 1981; Saint-Paul and Verdier, 1993; Boix, 2003; North, Wallis and Weingast, 2009). Finally, Stasavage (2005), focusing on the African context, develops a model explaining why democratically elected leaders will invest more

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<https://doi.org/10.20525/ijrbs.v9i7.968>

in primary education. Popular rural communities in African countries have strong desires to invest scarce public money on basic education rather than policies that favor urban interests (such as costly university systems), and these rural communities face far less cost of organising political action under democracy than autocracy (see also Bates, 1981).

As far as empirical research is concerned, Lake and Baum (2001) note a clear positive cross-country link between democracy and numerous human resource proxies, including student-to-fourth grade success levels, pupil-teacher ratios, separate school attendance ratios, and also literacy rates (which is, of course, a blunt proxy for quality education). But, many other researches – including case reports, small-n longitudinal experiments, and observational tests using time series variance – indicate that democracy extends access to and increases support for both primary and secondary schooling (Lindert, 2005; Stasavage, 2005; Engerman, Mariscal and Sokoloff, 2009; Huber and Stephens, 2012). For example, during the 19th and early 20th centuries, the historic increase of access to lower-level education in the US, UK, and Scandinavian countries seemed to have mirrored the increase of civil freedoms and, in particular, suffrage extensions (see Lindert, 2005).

Studying post-colonial Africa, Stasavage (2005) reveals how populism is closely associated with primary education expenditure in particular, and how elections led to the eventual elimination of school fees by Harding and Stasavage (2014). Interestingly, Harding and Stasavage (2014) also mention evidence from Kenyan voters' polls showing that they are conditioning their voting actions on the abolition of school fees, providing more concrete evidence for the type of theoretical argument discussed above.

The objective of the study is to focus on the relationship of democracy indices (electoral process and pluralism index, functioning of government index, political participation index, political culture index, civil liberties index) with literacy rate.

To attain the above objective rest of the part of the paper has been arranged in the following manner. Section 2 reviews the literature, section 3 discusses methodology, section 4 delineated hypothesis, section 5 illustrates model construction, section 6 explains results and discussion followed by conclusion, references and appendices.

## Literature Review

Amartya Sen argued that “Politically unfree citizens – whether rich or poor – are deprived of a basic liberty and of a fundamental constituent of good living” (2004, p10). He also emphasizes that not only does economic prosperity matter to people, but that democracy provides people with stability by encouraging them to keep the rulers responsible for their decisions. But politicians, who are chosen by the electorate, have more opportunities to fulfill the voters' wishes for re-election. This argument suggests that socialism would mean improved lives for the people, which Sen shows by the fact that a democratic nation has never undergone a significant famine (1999).

The relationship between democracy and education is discussed in many studies which explore the opposite direction, whether education increases the probability of democratization (Glaeser et al. 2006). Tsai (2006) studies the effect democracy has in developed countries on human growth. Regarding personal growth, he combines two different categories: physical well-being and educational resources. The measurement of educational success is calculated as the rate of enrollment for primary school, the rate of completion of fifth grade and the rate of enrolment for high school. He conducts the least absolute regressions of error to allow outliers to have less impact on the results. Tsai also explores the rate of change in human development, calculated as the 1995-1998 level of human growth relative to 1975-1984 averages. Ultimately, he controls the amount of GNP for government expenditure on education. The findings indicate that educational rates in democracies were considerably and obviously higher than in autocracies. The association between the rate of secondary school enrolment and the level of income was positive and substantial although government spending on education was low and poor. Tsai noticed that autocracies had greater increases in primary and secondary school enrollment rates than the democratic and semi-authoritarian countries did, but he acknowledges that most autocracies began at lower enrolment levels, making it harder to reach high rates of change. Democracies and semi-authoritarian countries have invested more resources on education, but the larger sums expended have not resulted in better educational results, suggesting a greater reliance on universities (2006).

Noble Laurites Theodore Schultz and Gary Becker theorize that in the labour markets, employment makes workers earn higher incomes. In fact, by investing in human resources via education, labour efficiency can be improved. It is often argued that increased workforce productivity is a function of low supplies of human resources and is also a result of rising incomes on the economy (HDRSA, 1998). Lower literacy translates through elevated rates of undernourishment, according to Food and Agriculture Organisation and World Food System (2010). As reported in South Asia's Human Development Report (1998), "A farmer with four years of education is 9 percent more competitive than his zero-educated counterparts," according to the World Bank. Burchi (2006) analyzed the relationship between employment, economic development, and food security through a cross-country study. He found that 100 percent increase in school enrollment among younger children would reduce food insecurity by around 22 percent, but this association was observed only for basic education but not for higher education.

Schultz (1988) and Becker (1993) have accepted the evidence of investments in intellectual capital through employment contributing to higher incomes and higher levels of business profitability. Empirical data from Bangladesh clearly backed the hypothesis by analyzing wage disparities among high school educated women found to be 7 times higher than the wages of non-educated women

(World Bank 1993). For Pakistan, it was observed that with 10 percent rise in male literacy, 2.7 percent rise in farm productivity while 10 percent increase in some other input raises half the production level as opposed to education (Rosegrant and Evenson 1993).

Surprisingly, qualified neighbors often have positive effects on the quality of the job relative to the neighbors who are illiterate. Foster and Rosenzweig (1995) conducted this sort of study in India. They found a 4 percent higher rate of productivity among non-schooling farmers if their neighbors had finished primary school education compared to the illiterates. Investing in human capital not only tends to increase incomes, income and profitability, but also fosters specific levels of return in the event of several years spent in educational institutions. In a report carried out by the World Bank (1994), it was examined that Nepalese citizens earned 100% return on investment on primary education, 29.1 and 15% on lower secondary and higher education, and 2.17% return on bachelor education, respectively. This was also delineated in the same report that the rate of return in the case of girls schooling was significantly higher than in the case of boys.

Lind (2008) analyses the reasons for and against literacy by stakeholders and concludes that "adult literacy has been de facto overlooked in real policies and capital allocations." The language disparity between official and unofficial languages creates a variety of issues that also harm linguistically, educationally and socio-economically vulnerable minority language speakers (Wagner, 2003).

## Research Methodology

### Data

We use both quantitative and qualitative data that are obtained from secondary sources. This research gathers quantitative data in form of literacy rate, democracy indices (electoral process and pluralism index, functioning of government Index, political participation index, political culture index, civil liberties index) of 134 countries from year 2007-2018. On the other hand, articles and working papers compile the qualitative evidence. Quantitative data were collected from Website World Bank and Gapminder. The quantitative data were primarily used to establish a regression model and to facilitate the study of sequences. The qualitative data, such as journal and working paper, were used for model creation and research improvements.

### Data Processing

The corresponding move would be to evaluate and identify variables after obtaining the secondary data. There are seven variables used to measure regression analysis when building the model. Literacy rate is used as dependent variable and others such as electoral process and pluralism index, functioning of government index, political participation index, political culture index, civil liberties index are used as independent variable. This paper conducted regression analyzes using Stata 15.1. Ordinary Least Square (OLS), Pooled Ordinary Least Square (POLS), Driscoll-Kraay (DK), Second Stage Least square (2SLS), Generalized Methods of Moments (GMM) methods are used to test the hypothesis.

### Hypotheses

Based on the analytical framework and previous studies, this study defines the following hypotheses:

*H1. Electoral Process and Pluralism Indices (EPPI) has a positive relationship with literacy rate*

*H2. Functioning of Government Indices (FGI) has a positive relationship with literacy rate.*

*H3. Political Participation Indices (PPI) has a positive relationship with literacy rate.*

*H4. Political Culture Indices (PCI) has a positive relationship with literacy rate.*

*H5. Civil Liberties Indices (CLI) has a positive relationship with literacy rate.*

### Model Construction

This research simplifies the model by directly relating literacy rate and some independent variables such as electoral process and pluralism indices, functioning of government indices, political participation indices, political culture indices, and civil liberties indices. The hypothesized relationship can be expressed as the following regression model:

$$L = f(LnEPPI, LnFGI, LnPPI, LnPCI, LnCLI)$$

Where,

*LnEPPI=Electoral Process and Pluralism Indices,*

*LnFGI= Functioning of Government Indices,*

*LnPPI= Political Participation Indices,*

*LnPCI= Political Culture Indices,*

*LnCLI= Civil Liberties Indices.*

After formulating the model, the next step is to define the equation. Since it is assumed that electoral process and pluralism indices, functioning of government indices, political participation indices, political culture indices, civil liberties indices are helpful for increasing literacy rate, a positive sign has been used for the coefficients of all indices.

The full equation model for the regression analysis is as follows:

$$L = \alpha + \beta_1 \ln EPPI + \beta_2 \ln FGI + \beta_3 \ln PPI + \beta_4 \ln PCI + \beta_5 \ln CLI + \mu$$

## Results and Discussion

With the aim to identify the impact of democracy indices on literacy rate, first, we are going to analyze the correlations among the variables we obtained from literature. A combined correlation matrix is given below to report the variables.

**Table 1:** Pairwise correlations matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) lnLR	1.000					
(2) lnEPPI	0.079	1.000				
(3) lnFGI	0.283	0.437	1.000			
(4) lnPPI	0.274	0.657	0.443	1.000		
(5) lnPCI	0.226	0.261	0.451	0.383	1.000	
(6) lnCLI	0.188	0.800	0.545	0.687	0.458	1.000

Table 1 shows little association among the variables indicating very low chance of endogeneity. Limited by the layout, only the correlation coefficient matrices and collinearity test results are provided here. However, the results meet the requirements of the correlation coefficient test and VIFs test. Also, the results show significance at least at .10 level for all the variables. No variable is showing association over .90 level.

### Econometric Models

Multiple regression models have been run with the same dependent (literacy rate) and independent variables (EPPI, FGI, PPI, PCI, CLI). In the following section the results of those models are presented and interpreted below.

#### Ordinary Least Square (OLS) model

**Table 2:** Ordinary Least Square (OLS) model

lnLR	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnEPPI	-.042	.006	-6.54	0	-.054	-.029	***
lnFGI	.059	.008	7.29	0	.043	.075	***
lnPPI	.152	.017	8.76	0	.118	.186	***
lnPCI	.05	.022	2.26	.024	.007	.093	**
lnCLI	.019	.015	1.29	.198	-.01	.049	
Constant	3.523	.078	44.95	0	3.369	3.676	***
Mean dependent var	4.426		SD dependent var		0.227		
R-squared	0.143		Number of obs		1608.000		
F-test	53.608		Prob > F		0.000		
Akaike crit. (AIC)	-442.765		Bayesian crit. (BIC)		-410.468		

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

In Ordinary Least Square (OLS) Model, table 2 shows functioning of government index, political participation index and political culture index have significant positive relationship with literacy rate. The more governmental functioning, political participation and political culture of a country, the more will be the literacy rate for the countries. Electoral process and pluralism indices have the significant negative relationship with the literacy rate of a country. On the contrary other independent variables have mixed but insignificant nature of relationship with literacy rate though the overall model is significant at 10% level. For more robustness of the results, the next model is run.

#### Pooled Ordinary Least Square (POLS) model

**Table 3:** Pooled Ordinary Least Square (POLS) model

lnLR	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnEPPI	-.005	.003	-1.70	.088	-.01	.001	*
lnFGI	-.008	.004	-1.94	.052	-.017	0	*
lnPPI	.074	.006	12.09	0	.062	.086	***
lnPCI	.005	.011	0.42	.677	-.017	.027	
lnCLI	-.053	.01	-5.18	0	-.074	-.033	***
Constant	4.387	.06	72.89	0	4.269	4.505	***
Mean dependent var	4.426		SD dependent var		0.227		
Overall r-squared	0.000		Number of obs		1608.000		
Chi-square	184.865		Prob > chi2		0.000		
R-squared within	0.115		R-squared between		0.001		

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

In Pooled Ordinary Least Square Model, table 3 shows political participation index and political culture index have significant positive relationship with literacy rate. The more political participation and political culture of a country, the more will be the literacy rate for the countries. Electoral process and pluralism indices, functioning of government index and civil liberties indices have the significant negative relationship with the literacy rate of a country. On the contrary other independent variables have mixed but insignificant nature of relationship with literacy rate though the overall model is significant at 1% level. For more robustness of the results, the next model is run.

**Driscoll-Kraay pooled OLS (DK) model**

**Table 4:** Driscoll-Kraay pooled OLS model

Regression with Driscoll-Kraay standard errors	Number of obs	= 1608
Method: Pooled OLS	Number of groups	= 134
Group variable (i): ID	F( 5, 11)	= 466.50
maximum lag: 2	Prob > F	= 0.0000
	R-squared	= 0.1433
	Root MSE	= 0.2105

lnLR	Coef.	Std.Err.	T	P>t	95%Conf.	Interval]
lnEPPI	-0.042	0.006	-6.920	0.000	-0.055	-0.028
lnFGI	0.059	0.003	17.890	0.000	0.052	0.067
lnPPI	0.152	0.016	9.670	0.000	0.117	0.186
lnPCI	0.050	0.017	2.990	0.012	0.013	0.086
lnCLI	0.019	0.008	2.550	0.027	0.003	0.036
_cons	3.523	0.052	68.000	0.000	3.408	3.637

In Driscoll-Kraay pooled OLS model, Table 4 shows functioning of government index, political participation index, political culture index and civil liberties index have significant positive relationship with literacy rate. The more governmental functioning, political participation, political culture and civil liberties, the more will be the literacy rate for the countries. On the contrary other independent variable (EPPI) has significant negative relationship with literacy rate though the overall model is significant at 5% level. For more robustness of the results, the next model is presented.

**Two stage least square (2SLS) model**

**Table 5:** Two stage least square (2SLS) model

lnLR	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnEPPI	-.042	.006	-6.54	0	-.054	-.029	***
lnFGI	.059	.008	7.29	0	.043	.075	***
lnPPI	.152	.017	8.76	0	.118	.186	***
lnPCI	.05	.022	2.26	.024	.007	.093	**
lnCLI	.019	.015	1.29	.198	-.01	.049	
Constant	3.523	.078	44.95	0	3.369	3.676	***
Mean dependent var		4.426				0.227	
R-squared		0.143				1608.000	
F-test		53.608				0.000	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 5 shows functioning of government index, political participation index and civil liberties index have significant positive relationship with literacy rate. The more governmental functioning, political participation and civil liberties help to increase literacy rate for the countries. On the contrary other independent variable (EPPI) has significant negative relationship with literacy rate though the overall model is significant at 5% level. Civil liberties index has positive but insignificant relationship with the literacy rate. For more robustness of the results, the next model is added.

**Generalized method of moments (GMM) model**

**Table 6:** Generalized method of moments (GMM) model

lnLR	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
L.lnLR	.835	.057	14.58	0	.723	.948	***
lnEPPI	.001	.003	0.44	.659	-.005	.007	
lnFGI	.007	.005	1.28	.199	-.003	.016	
lnPPI	.027	.008	3.21	.001	.01	.043	***
lnPCI	-.029	.012	-2.30	.021	-.053	-.004	**
lnCLI	-.004	.013	-0.34	.734	-.029	.021	
Constant	.733	.266	2.75	.006	.211	1.255	***
Mean dependent var		4.428				0.225	
Number of obs		1340.000				665.195	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 6 shows political participation index and political culture index have significant positive relationship with literacy rate. The more political participation and political culture is helpful for increasing literacy for the countries. On the contrary other independent variables (EPPI, FGI, CLI) have insignificant positive and negative relationship with literacy rate though the overall model is significant at 5% level.

### Comparative coefficient analysis of the empirical models

**Table 7:** Comparative coefficient analysis of the empirical models

Model	Regression equation
OLS	$L = 3.523 - 0.059 \ln EPPI + 0.059 \ln FGI + 0.152 \ln PPI + 0.05 \ln PCI + 0.010 \ln CLI$
POLS	$L = 4.387 - 0.005 \ln EPPI - 0.008 \ln FGI + 0.074 \ln PPI + 0.005 \ln PCI - 0.053 \ln CLI$
DK	$L = 3.523 - 0.042 \ln EPPI + 0.059 \ln FGI + 0.152 \ln PPI + 0.050 \ln PCI + 0.019 \ln CLI$
2SLS	$L = 3.523 - 0.042 \ln EPPI + 0.059 \ln FGI + 0.152 \ln PPI + 0.050 \ln PCI + 0.019 \ln CLI$
GMM	$L = 0.733 + 0.001 \ln EPPI + 0.007 \ln FGI + 0.027 \ln PPI - 0.029 \ln PCI - 0.004 \ln CLI$

The results of different models establish that political participation index and political culture index has significant positive relationship with literacy rate in all the method. Functioning of government index has significant positive relationship and electoral process and pluralism index has significant negative relationship with literacy rate in all the methods except GMM method. Civil liberties index has significant negative relationship with literacy rate in POLS and in the other models there is no significant relationship between the civil liberties index and literacy rate.

Based on the findings of the study, it can be recommended that a country should not put its concentration mostly on enhancing governmental functioning, political participation and political culture for increasing literacy rate of a country. Other democracy indices like electoral process and pluralism index, civil liberties index are affecting the literacy rate of a country in an unstructured and undesired way. The insight of this finding may require separate study. Overall, the study of 134 countries through a 12 years' dynamic panel data has come up with valuable findings to understand the economies of the world with respect to literacy rate and democracy indices.

The broad finding that democracy is not necessarily enhancing literacy rate in every aspect except for governmental functioning, political participation and political culture. Specifically, this paper had mainly contributed in two aspects: firstly, it has predicted and shown the relationship of literacy rate with democracy indices across the countries of the world and secondly it has scrutinized and identified the impact of different democracy indices on literacy rate through robust models like DC, 2SLS, GMM.

### Conclusion

The ultimate objective of the research was achieved through the present study. The relationship between democracy and literacy has now been discovered. How democracy affects a nation's literacy rate has been well illustrated in the study. Different indices of democracy have shown various forms of effect on literacy. This study showed that in all the approaches, the political participation index and the political culture index have a significant positive relationship with the rate of literacy. The functioning of the government index has a significant positive relationship, and the democratic mechanism and pluralism index in all methods except the GMM system have a significant negative relationship with the literacy rate. The index of civil liberties has a substantial negative relationship with the literacy rate in POLS, and there is no significant relationship between the index of civil liberties and the literacy rate in other models.

The academia would be complemented through the analysis on the impact of democracy indices on literacy rate. This study will show how to use these different regression models jointly come up with the same results. Besides, academics of economic arena would be aware of the fact that which democracy indices are increasing literacy rate most. They will also be assisted to analyze further how to conduct more refined studies regarding literacy rate and democracy indices. The concept of literacy rate and democracy indices can also be used in broad theoretical discussion of the economic world in upcoming future.

Data were not collected for all the countries of the world because of the availability in the database. Also, more than 12 years' data would have been more conclusive. Data had to be converted for analysis which may lead to discrepancies. Besides, many variables have been untouched in this research. Future study may be conducted on finding out the most important determinants of literacy rate besides the democracy indices.

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**Appendix:** List of countries which data are used

Afghanistan	Egypt	Lithuania	Senegal
Albania	El Salvador	Madagascar	Serbia
Algeria	Equatorial Guinea	Malawi	Sierra Leone
Angola	Eritrea	Malaysia	Singapore
Argentina	Estonia	Mali	Slovenia
Armenia	Ethiopia	Malta	South Africa
Azerbaijan	Fiji	Mauritania	South Korea
Bahrain	Gabon	Mauritius	Spain
Bangladesh	Gambia	Mexico	Sri Lanka
Belarus	Georgia	Moldova	Sudan
Benin	Ghana	Mongolia	Suriname
Bhutan	Greece	Montenegro	Tajikistan
Bolivia	Guatemala	Morocco	Tanzania
Bosnia and Herzegovina	Guinea	Mozambique	Thailand
Botswana	Guinea-Bissau	Myanmar	Timor-Leste
Brazil	Guyana	Namibia	Togo
Bulgaria	Haiti	Nepal	Trinidad and Tobago
Burkina Faso	Honduras	Nicaragua	Tunisia
Burundi	Hungary	Niger	Turkey
Cambodia	India	Nigeria	Turkmenistan
Cameroon	Indonesia	North Korea	Uganda
Central African Republic	Iran	Oman	Ukraine
Chile	Iraq	Pakistan	United Arab Emirates
China	Italy	Panama	Uruguay
Colombia	Jamaica	Papua New Guinea	Uzbekistan
Comoros	Jordan	Paraguay	Venezuela
Congo, Dem. Rep.	Kazakhstan	Peru	Vietnam
Congo, Rep.	Kenya	Philippines	Zambia
Costa Rica	Kuwait	Poland	Zimbabwe
Cote d'Ivoire	Kyrgyz Republic	Portugal	
Croatia	Lao	Qatar	
Cyprus	Latvia	Romania	
<b>Czech Republic</b>	Lebanon	Russia	
<b>Dominican Republic</b>	Lesotho	Rwanda	
<b>Ecuador</b>	Liberia	Saudi Arabia	



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