Socioeconomic status and Democratization <South Africa, Botswana, and Kenya compared

Abstract

Introduction

The dictionary meaning of "Democracy" defined by Encyclopedia Britannica is "literally ruled by the people." As we all learned from social science classes from junior high school, democracy is derived from the Greek words "coined from demos -people- and kratos -rule- in the middle of the 5th century BC to denote the political systems" in Athens. In modern usage, democracy often refers to a system of government where the citizens exercise power directly or through electing representatives in order to form a parliament. Thus, it is to be distinguished from monarchy or dictatorship. Yet, there is no consensus on how to define democracy while some of characteristics such as political freedom, rule of law, and equality before the law are commonly seen and identified as basic features of democracy. According to The Economist Intelligence Unit's index of democracy written by Laza Kekic, "the fundamental features of a democracy include government based on majority rule and the consent of the governed, the existence of free and fair elections, the protection of minorities and respect for basic human rights" (1). Also, the United Nations sees democracy as "one of the universal and indivisible core values [which] is based on the freely expressed will of people and closely linked to the rule of law and exercise of human rights and fundamental freedoms." Sometimes, the terms "freedom" and "democracy" are used interchangeably. But democracy, as a set of practices and principles about freedom, rather protects freedom and equality.

Measuring democracy also has been contested that there still have ongoing debates on this subject. The most widely-known measure is from the US-based Freedom House organization, which aggregates scores of 25 indicators up to 100, on a 1 to 7 rating scale, from political rights and civil liberties. For the report of 2016, Freedom House evaluated the state of freedom in 195 countries and 15 territories during calendar year 2015, and 125 countries are classified as electoral democracies. The Freedom House's electoral democracy measure is a thin or minimalist whose measure of democracy may differ from thick or wider measures which include various aspects of social and political culture in democratic societies. Another organization where also provides measures of democracy and regime types based on minimalist definitions is The Polity Project. Specifically focused on the institutionalized authority patterns of the state regime, The Polity Project "examines concomitant qualities of democratic and autocratic authority in governing institutions [.to] envision a spectrum of governing authority that spans from fully institutionalized autocracies through mixed, or incoherent, authority regimes to fully institutionalized democracies (Center for Systemic Peace). For our current research, this Polity data from the Polity Project will be used. The detailed information with regard to the"Polity Score" will be discussed at the "Data, Variables, and Methods" section.

Following the introduction, this research paper will proceed by presenting background researches about democratization and its history in Africa to set up the baseline and link to our research question and hypotheses at the following section. After that, details about data, variable selections, and overall statistical methods will be addressed along with explanations how the authors collected, cleaned, and utilized each variable. Based on the cleaned data, the authors will provide descriptive analyses as a preliminary stage, and then the multivariate analyses conducted based on the various statistical models will be interpreted by concentrating on the effects of four socio-economic variables on democratization in three selected African countries.

Background about Democratization and its brief history in Africa

Democratization, according to An Agenda for Democratization by Boutros Boutros-Ghali, the formal Secretary General of the United Nations, "is a process which leads to a more open, more participatory, less authoritarian society" (1) within a sovereign state. Between the years 1974 and 1990, the world experienced "Third Wave" of democratization which had changed 30 countries from authoritarian regimes to democracies. The penetration and success of democratization in this time period displayed different examples and outcomes, and this raised the questions for the causes of change between political regimes and how the process of democratization sustained in non-democratic societies.

From his On Democracy, Robert Dahl suggests three conditions that are essential to attain democratic institutions through democratization and they are: control over military and police forces by elected officials; the absence of foreign intervention opposing democratization; democratic beliefs and political culture; [possibly] modern market economy and economic growth; and the absence of cultural pluralism. Similarly, Samuel Huntington, from his book The Third Wave, argues that democracy could be realized through one of three main types of democratization process and they are: transformation led primarily by the ruling elites; replacement where the opposition plays the main role; and transplacement, a product of active engagement of both sides. With looking into these arguments, it can be claimed that there is no single precondition or factor which perfectly lead the country to be democratized. It has to be a combination of features which should be uniquely and country specifically taken since the strength of each factor may bring different impacts to country by country.

Africa has also been the wave of political transitions from various types of dictatorships to more open political systems by accepting democracy as a political alternative. However, to understand the democracy and the democratization in Africa, its background of "the relatively recent end to colonial rule [.], post-colonial utopian African socialism, [.] and economic regression in the 1980s" (Samarasinghe, 1994) has to be taken into account. In particular, the colonial period needs to be understood since it was colonial rulers who were autocratic and discouraged indigenous people to build democratic institutions and societies. Even after the independence, the artificiality of Africa's national borders and of the societies within worsened the problem and prevented the transition to democracy. During the first half of 1990s, many African countries had one party and military rule which were followed by political protests and competitive elections with democratic trend indicators continuing to rise. Although the surge of democratic trends with the liberalized political system swept across African countries during this time period, they could not proceed to the full democracy. The repetition of the onset of democratization and frequent slips back to authoritarianism took place in Africa due to a set of existing political structures which had been governed through coercion and a lack of institutional capacity for the provision of basic services and law and order. In spite of all these negative factors, many of African countries has been constantly making progress towards the democracy not only by revolting against authoritarian leaders based on demand-driven activities, but also by the improvement of other numerous socio-economic indicators which may influence the political transformation, even though the speed of transition is different and non-linear.

Research Question and Hypotheses

The current research aims to help our understanding of the democracy with regard to its concept structure by investigating the effects of various socio-economic variables on democratization in African countries. Therefore, our research question is to assess how four important socioeconomic variables, namely income growth, primary education enrollment, gender equality in labor force, and child mortality, affect the regime change to democracy and the consolidation of democratic institutions through sustaining the process of democratization. By analyzing the relationship between socioeconomic components and democracy, the authors are ultimately trying to investigate each variable's impact on democratization and to compare the degree of effects not only among indicators but also across selected countries, South Africa, Botswana, and Kenya. Our research question is on the basis of one of the most well-known theories, modernization, which claims that socio-economic development brings about democracy. According to modernization theory,

basic needs such as food, shelter and health must be satisfied to achieve democracy. Dhal also argues that "adequate institutions and a citizenry, especially a middle class, receptive to democratic ideals, must exist for democratization to take place" (Samarasinghe, 17).

Sub-Saharan African countries, where continuously have been experiencing democratic progress and setbacks due to frequent violence triggered by political conflicts in spite of their future development potentials, are still more democratic today than in any other periods of time. From the authors' academic interests as well as sincere hope for more meaningful processes towards democratization, African countries are selected to be studied, compared, and tested for the current research study. In order to effectively analyze and answer to the research question, following three hypotheses are set up to be tested:

1. There is a significant and positive correlation between socioeconomic variables and democracy.
2. Among four socioeconomic variables - GDP, primary education enrollment, gender equality, and child mortality - the educational effect on democracy is stronger than any other variables.
3. The degree of impact of variables on democracy is consistent across selected African countries.

Literature Review

With regard to measuring democracy, Robert J. Barro, for his paper Determinants of Democracy, used the indicator of electoral rights compiled by Gastil and his followers at Freedom House from 1972 to 1995. He observed the sub-Saharan African's decline in electoral rights after 1960 and back to rise in 1995. According to his argument, "many of African countries [experienced the pattern of fluctuation because they] began with ostensibly democratic institutions when they became independent in the early 1960s, but most evolved into one-party dictatorships by the early 1970s," (1999) and also the democratization in Africa since 1989 was substantial. Although the authors of this current research paper used different data to measure democracy, we also observed sub-Saharan African's fluctuations in democracy, implying that there are some drivers that affects the level of democracy overtime.

Further, Barro quotes Lipset's argument based on the Lipset hypothesis, which claims that increased education and an enlarged middle class are key elements for the extent of democracy, as in general increases in various measures of the standard of living forecast a gradual rise in democracy. To test this, Barro ran the basic regression for electoral rights -democracy- with the explanatory variables: the log of real per capita GDP and measures of educational attainment. According to his data results, the schooling figures that turn out to have the most explanatory power are the average years of attainment at the primary level for persons aged 25. In regard to the correlation between GPD and democracy, Barro claims that more prosperous places are more likely to be democratic, displaying positive upward trends between per capita GDP and schooling to democracy. Yet, Barro states the necessity for the development of theories of the determination of democracy due to a lack of theoretical models of the relation.

In the second literature of Democracy and Gender Equality by Caroline Beer, she contrasts the impact of long-term stocks of democracy with the contemporary level of democracy and the participation of women in democracy. This study was conducted in the basis of a generally accepted assumption - also one of our hypotheses- that democracy and gender equality go hand in hand, therefore, democracy promotes the well-being of women. In her previous studies, Beer quotes Richard and Gelleny's research Women's status and economic globalization, which measure the status of women with the United Nations Gender-related Development Index (GDI) and Gender Empowerment Index (GEM) and find the positive relationship between democracy and their indicators of women's status. On the other hand, according to Fish, gender equality causes democracy, suggesting the reverse causality (Islam and authoritarianism, 2002), while Inglehar, Norris, and Welzel find that modernization leads to cultural changes that produce more democracy and gender equality; therefore, the correlation between democracy and gender equality is spurious. (Gender equality and democracy, 2002). Overall from Beer's previous studies, there is not clear statistical evidence which demonstrate the effects of gender equality on democracy and vice versa. Measuring gender equality in terms of the percentage of the population that is female, the ratio of female life expectancy at birth to that of males, the percentage of the total labor force that is female, Beer however finds that, all else equal, long-term

democracies tend to promote greater gender equality than authoritarian regimes. Based on the all previous researches, how to measure "democracy" and "gender equality" brings different consequences and the findings are thus ambivalent and inconsistent.

John M. Shandra et al. approaches child morality from different theoretical perspectives. By taking political modernization perspective, he quotes from the previous studies that the level of political democracy influences the level of child mortality in developing countries, while Shandra et al. finds only one study which supports for the hypothesized inverse relationship between democracy and child mortality. Setting up the analysis with child mortality rate as a dependent variable, and level of economic development, level of educational attainment, level of female educational attainment, level of political democracy and etc. as independent variables, Shandra et al. finds that the interaction terms between the level of democracy and transnational economic linkages associated with exports and multinational corporations adversely affect child mortality more strongly at lower levels of democracy than at higher levels of democracy. The researchers also lay out their limitations by stating that more multivariate studies are required with more longitudinal data in order to understand the effects of determinants on child mortality. Tanja AJ Houweling et al. in their Determinants of under-5 mortality among the poor and the rich: a cross-national analysis of 43 developing countries which studies how under-5 mortality rates vary with the national level context, they argue that more democratic and ethnically homogeneous countries show significantly lower total under-5 mortality rates in the univariate analysis. While there are poor-rich inequalities in childhood mortality, the research suggests that democracy has a role in reducing the inequalities.

Data collection and data cleaning

Data collection

In order to achieve our research purpose, firstly we have to decide what kind of data is necessary. Our reserach hypothesises are following,

- 1. There is a significant and positive correlation between socioeconomic variables and democracy.
- 2. Among four socioeconomic variables - GDP, primary education enrollment, gender equality, and child mortality - the educational effect on democracy is stronger than any other variables.
- 3. The degree of impact of variables on democracy is consistent across selected African countries.

To test these hypothesis, we need measurement of democracy and socioeconomic variables. We used following variables.

Variable name	Detail	Source
polity4	measurement of democracy	the Center for systemic peace
gdppc	Gross Domestic Production Per Capita	World Bank
pe	Primary ed enrollment	United Nations
mr	Child Mortality under 5	United Nations
gi	gender inequality in labor market	United Nations

- Measurement of democracy We used polity4 as a measurement of democracy. Polity4 represents the degree of democratization. The democratization level being higher, the score also being high. We downloaded from this site. http://www.systemicpeace.org/inscrdata.html
- GDP per capita:We bring this data from World Bank database. GDP per capita represents the level of satisfaction in basic needs. The following URLs are WorldBank sites in which we downloaded the time-series data of GDP for each country. http://data.worldbank.org/indicator/NY.GDP.PCAP.CD, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=BW, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=KE

- Primary education enrollment: We used Primary education enrollment as one of representative of basic needs. The URL is United Nations site in which we downloded the data. http://data.un.org/Data.aspx?q=education&d=UNESCO&f=series%3aE_1
- Mortality under 5 years old: We used this unit as measurement of health among citizens.http://data.un.org/Data.aspx?q=mortality&d=PopDiv&f=variableID%3a77
- Gender Inequality in labor market: We used gender inequality in labor market to test whether thare is another important factor other than basic needs which is suggested in modernization theory. We calculated this unit as follows,

$$GenderInequality = \frac{EmploymentRateAmongWomen}{EmploymentRateAmongMen}$$

You can find the data from ILO official site. http://www.ilo.org/ilostat/faces/help_home/data_by_subject/subject-details/indicator-details-by-subject?subject=EMP&indicator=EMP_2EMP_SEX_AGE_NB&datasetCode=YI&collectionCode=ILOEST&_afrLoop=201714902217437#!%40%40%3Findicator%3DEMP_2EMP_SEX_AGE_NB%26subject%3DEMP%26_afrLoop%3D201714902217437%26datasetCode%3DYI%26collectionCode%3DILOEST%26_adf.ctrl-state%3D102r3mzd68_271

Data cleaning and importing into R

We downloaded each data as excel and csv file. Then, we subtructed time series data for each variables and countries and put together into three csv files which represents each countries so that we can easily import data into R. So we have three csv files each represents SouthAfrica, Botswana, and Kenya. We will import it into R.

```
dfsa <- read.csv("SA.csv", header = TRUE, sep = ",")
dfbo <- read.csv("BTW.csv", header = TRUE, sep = ",")
dfkn <- read.csv("KNY.csv", header = TRUE, sep = ",")
dfpanel <- read.csv("panel.csv", header = TRUE, sep = ",")
```

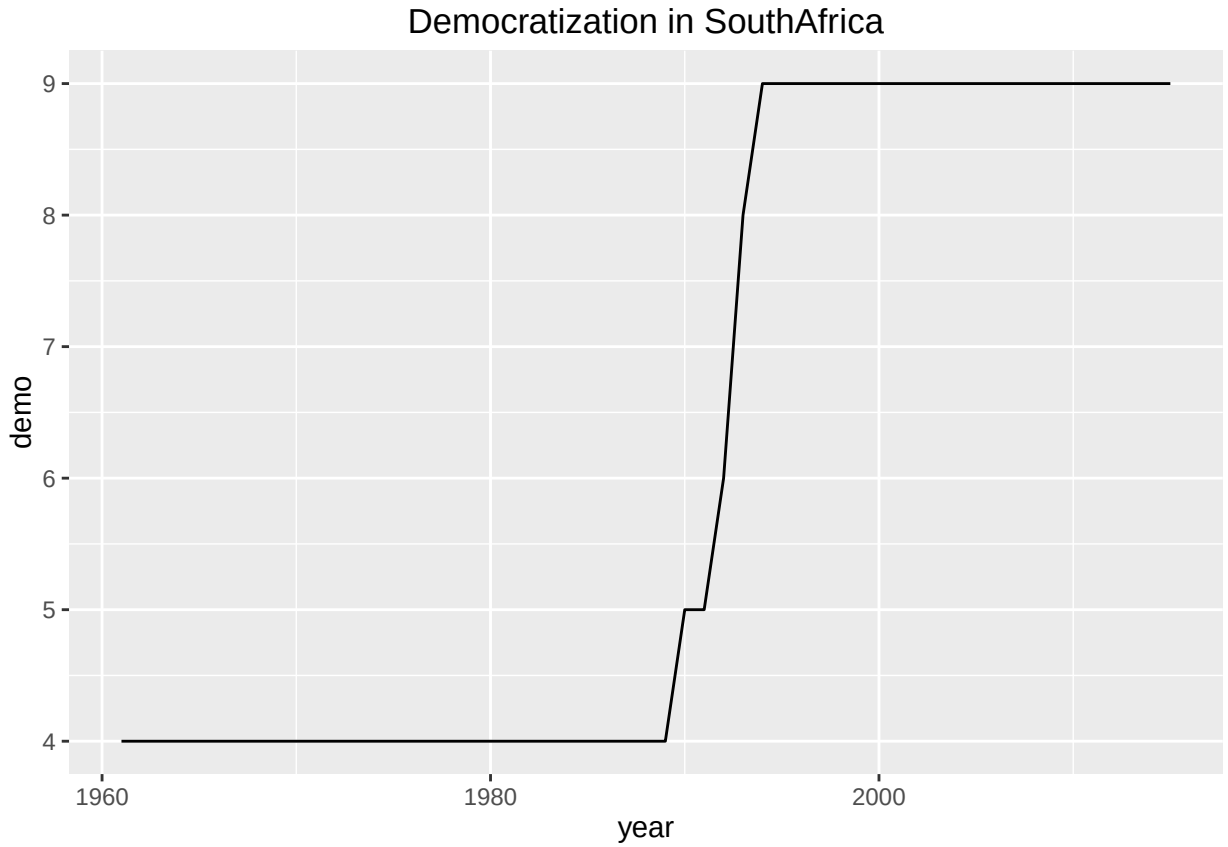
Now we suceeded to import all files.

Descriptive Analyses

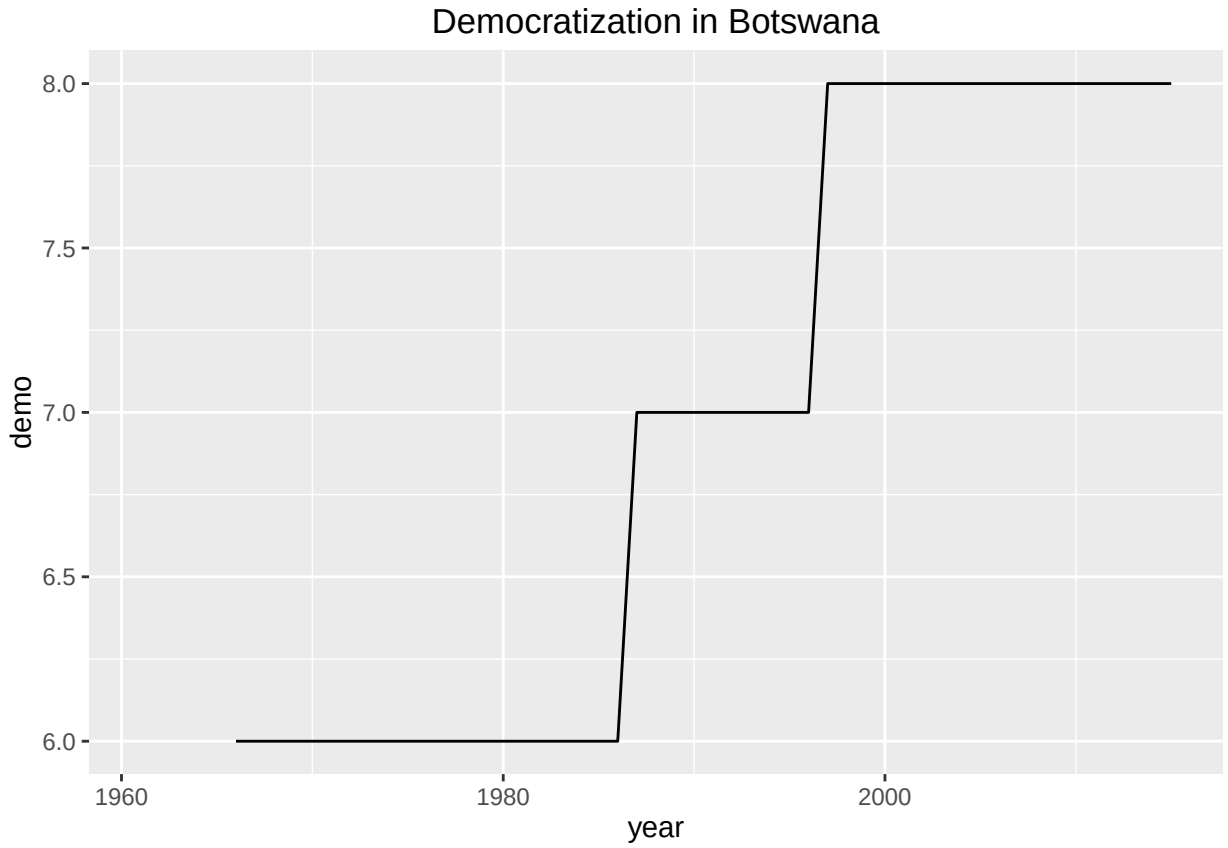
In this section, we will povide descriptive statistics of our variables.

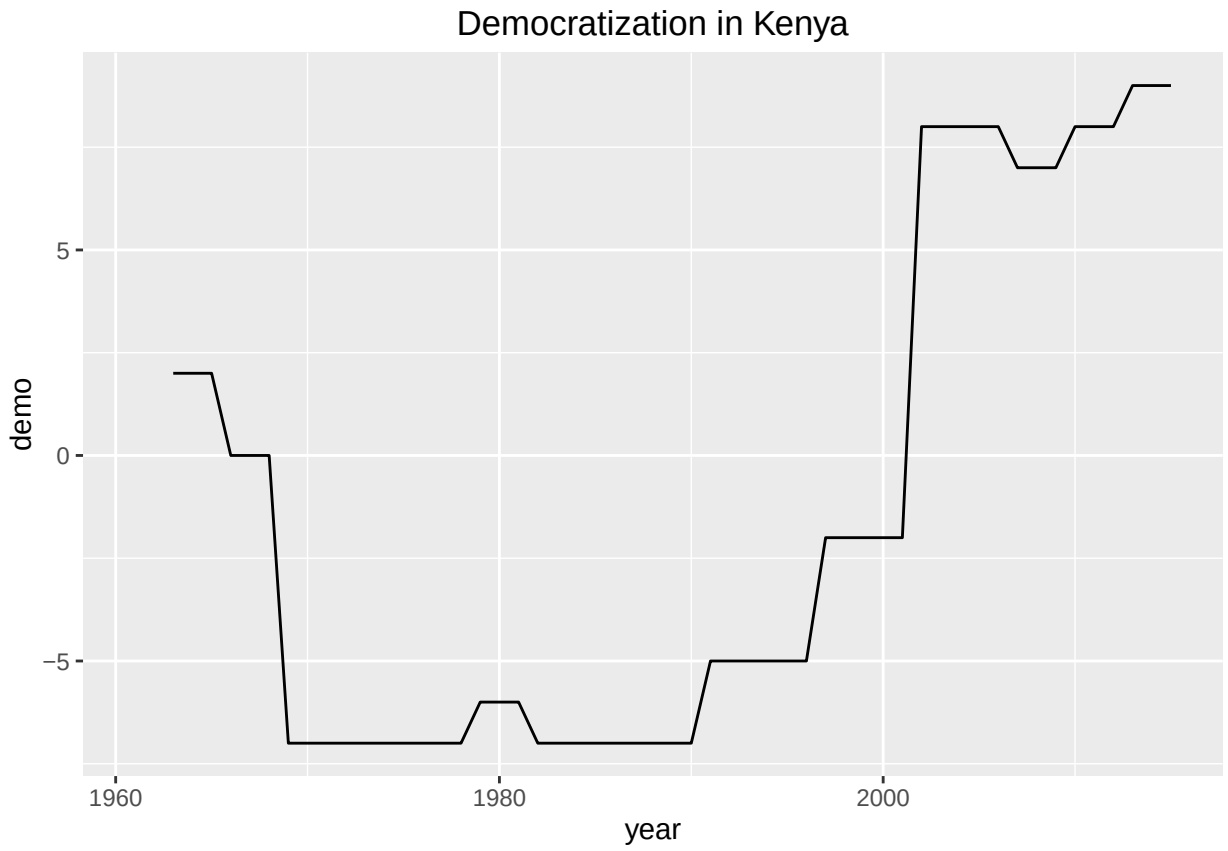
Democratization

Following graphs are trend of democratization for each countries.



This is the trend of democratization in South Africa. As you can easily see, the level of democratization dramatically increased during 1990~1995. The contributor of this trend is the abolishment of Apartheid.


Democratization in Botswana
8.0
7.5
7.0
6.5
6.0
demo
1960
1980
2000
year


Democratization in Kenya
5
0
−5
demo
1960
1980
2000
year

As graphs showing, the level of democratization has been fluctuated. Sometimes democracy advances, and sometimes it setbacks. We will investigate the data to clearify what is the driver of these fluctuation.

Multivariate Analyses

In this section, we will start quantitative analysis. The purpose of this quantitative research is to clearlify the effect of socioeconomic factors on the dgree of democratization and compare the each coefficients among countries. So we devide this part into three part. In the first part, we will investigate country specific coefficients for each variables by running regression analysis for each country and compare the coefficients among countries to make the characteristics of each countries clear. In the second part, we will run panel regression to investigate general effect of each variables on the degree of democratization. To achieve this purpose, we will use several models to eliminate country specific effects, compare the results of each models and decide the most effective model (the model which provide unbiased and most efficient coefficients). In the final part, we discuss the results and test our hypothesises.

Regression analysis for each country

In this part, we will run OLS regression analysis for each part. We use following model,

$$polity4 = \beta_0 + \beta_1 \log gdppc + \beta_2 \log pe + \beta_3 \log mr + \beta_4 \log gi$$

Please see the table in sections above to see details of each variables.

We used logalism for each explanatory variables since we want to compare the effect of each variables. Because of huge difference in the scale of each variables, we cannot compare the effects without logalism. If we use logarism transformation in each variables, the changes in each variables are transformed into parcentage change. Therefore, we can compare the effects of each variables in same scale.

Then, we run the OLS regression for each country. The table 2 is the results of each regressions. This results includes coefficients value and its significant level.

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As you can see the table 2, each country has different value of coefficients and significance level for explanatory variables. For example, in South Africa gdppc has negative effect on the degree of democracy while in Botswana gdppc has positive effect. In Kenya, gdppc is even not significant. This uniqueness among each country is the same for other explanatory variables. We try to extract some concensus from these results.

There is no concensus in GDP per capita. In South Africa gdppc has negative effect on the degree of democracy while in Botswana gdppc has positive effect. In Kenya, gdppc is even not significant. This means that the effectiveness of gdp per capita on the degree of democracy is different for each country.

Primary enrollment is insignificant in all country. This result seems contradicting to previous researches in which education level is significant for democracy.

Mortality rate under 5 years old is in the same chaos like gdppc. They are significant in Botswana and Kenya, however, the effects on the degree of democracy is opposit way. In Botswana, they have positive effect. That means if the number of dead children increases, the democracy also advance. On the other hand, they have negative effect in Kenya. That means if the number of dead children increases, the democracy will setback.

Gender inequality have concensus in South Africa and Kenya. In both country, they are significant and negative effects on the degree of democracy. The negative effects means that if the employment rate of women increases comparing to men's, the level of democracy will be deteriorated. This sounds unnatural. However, according to some research, among agricultural countries it is likely to possible that the employment rate of

Table 2: Regression results for each country

	Dependent variable:		
		demo	
	SouthAfrica	Botswana	Kenya
	(1)	(2)	(3)
log(gdppc)	-2.78^{*}	1.86^{***}	-6.37
	(1.43)	(0.56)	(3.79)
log(pe)	0.81	-3.29	9.05
	(2.83)	(2.31)	(8.68)
log(mr)	-11.16	2.84^{***}	-34.05^{***}
	(7.05)	(0.84)	(9.39)
log(gi)	-43.66^{***}	4.61	-147.18^{***}
	(13.70)	(2.85)	(38.41)
Constant	44.40	23.80	21.71
	(73.50)	(22.73)	(157.22)
Observations	17	21	19
R^2	0.93	0.85	0.92
Adjusted R^2	0.90	0.82	0.90
Residual Std. Error	0.72 (df = 12)	0.28 (df = 16)	1.94 (df = 14)
F Statistic	38.99^{***} (df = 4; 12)	23.04^{***} (df = 4; 16)	42.66^{***} (df = 4; 14)
Note:			*p<0.1; **p<0.05; ***p<0.01

women have negative effect on the democracy because in agricultural society tend to have high employment of women comparing to industrialized society. It can be said that this result can be evidence for assumptions of such research.

Regression Analysis on panel data

In this section, we will run regression on panel data(which is include time-series data for every country) to investigate the effects of each explanatory variables in general. Firstly, we will conduct pooled OLS regression by using following regression model.

$$polity4 = \beta_0 + \beta_1 \log gdppc + \beta_2 \log pe + \beta_3 \log mr + \beta_4 \log gi$$

Table 3 is the result of pooled OLS and previous results for each countries.

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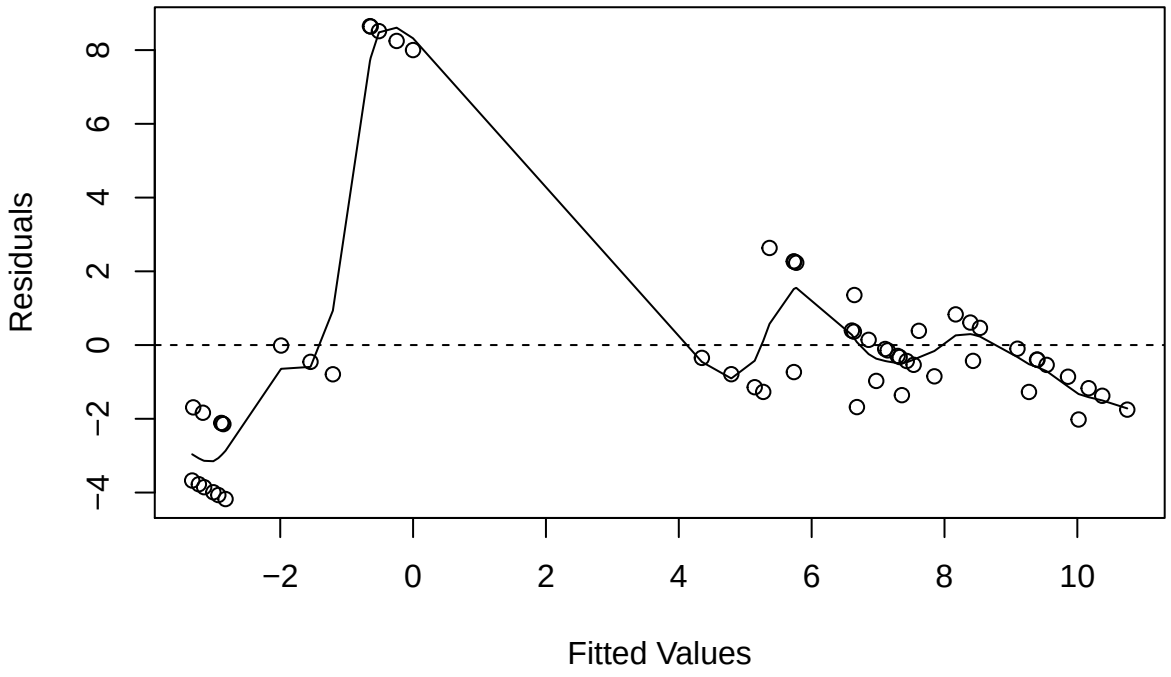
Table 3: Regression results of pooled OLS and for each countries

	Dependent variable:			
	demo			
	SouthAfrica	Botswana	Kenya	Pooled OLS
	(1)	(2)	(3)	(4)
log(gdppc)	-2.78^{*}	1.86^{***}	-6.37	-0.64
	(1.43)	(0.56)	(3.79)	(1.39)
log(pe)	0.81	-3.29	9.05	-1.10^{**}
	(2.83)	(2.31)	(8.68)	(0.46)
log(mr)	-11.16	2.84^{***}	-34.05^{***}	-6.89^{**}
	(7.05)	(0.84)	(9.39)	(3.06)
log(gi)	-43.66^{***}	4.61	-147.18^{***}	-39.08^{***}
	(13.70)	(2.85)	(38.41)	(10.91)
Constant	44.40	23.80	21.71	41.87^{*}
	(73.50)	(22.73)	(157.22)	(21.14)
Observations	17	21	19	57
R^2	0.93	0.85	0.92	0.72
Adjusted R^2	0.90	0.82	0.90	0.70
Residual Std. Error	0.72 (df = 12)	0.28 (df = 16)	1.94 (df = 14)	3.16 (df = 52)
F Statistic	38.99^{***} (df = 4; 12)	23.04^{***} (df = 4; 16)	42.66^{***} (df = 4; 14)	33.01^{***} (df = 4; 52)
Note:				*p<0.1; **p<0.05; ***p<0.01

Now the explanatory variables except gdppc turned out to be significant. However, in the same time, the adjusted R-squared become less than 0.8. Is it possible to treat these coefficients as efficient and unbiased?

residual vs fitted value



Breusch-Pagan test

```
##
##  studentized Breusch-Pagan test
##
## data:  L4
## BP = 12.672, df = 4, p-value = 0.01299
```

Fixed-Effect model

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constants:

```
fixef(fixed)
```

```
##     Botswana        Kenya South Africa
##    -139.0599    -186.3148    -191.4030
```

Do panel specific effects exist?

```
pFtest(fixed,pooled)
```

```
##
##  F test for individual effects
```

Table 4: pooled OLS and fixed effects OLS

	Dependent variable:	
	demo	
	PooledOLS	FixedOLS
	(1)	(2)
log(gdppc)	−0.644	−1.496
	(1.393)	(1.424)
log(pe)	−1.103**	15.793***
	(0.456)	(4.012)
log(mr)	−6.886**	−12.087***
	(3.062)	(3.176)
log(gi)	−39.075***	−28.940**
	(10.914)	(11.221)
Constant	41.873*	
	(21.138)	
Observations	57	57
R^2	0.717	0.610
Adjusted R^2	0.696	0.563
F Statistic	33.013*** (df = 4; 52)	19.532*** (df = 4; 50)
Note:		*p<0.1; **p<0.05; ***p<0.01

```
##
## data:  demo ~ log(gdppc) + log(pe) + log(mr) + log(gi)
## F = 17.075, df1 = 2, df2 = 50, p-value = 2.228e-06
## alternative hypothesis: significant effects
```

Breush-Pagan test

```
##
##  Lagrange Multiplier Test - (Breusch-Pagan) for unbalanced panels
##
## data:  demo ~ log(gdppc) + log(pe) + log(mr) + log(gi)
## chisq = 0.67568, df = 1, p-value = 0.4111
## alternative hypothesis: significant effects
```

we cannot reject the null hypothesis. (residuals doesn't correlated with independent variables)

Random-Effects OLS

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Table 5: random effects OLS

	Dependent variable:		
	demo		
	(1)	(2)	(3)
log(gdppc)	−0.644	−1.496	−1.496
	(1.393)	(1.424)	(1.396)
log(pe)	−1.103**	15.793***	15.793***
	(0.456)	(4.012)	(3.934)
log(mr)	−6.886**	−12.087***	−12.087***
	(3.062)	(3.176)	(3.114)
log(gi)	−39.075***	−28.940**	−28.940**
	(10.914)	(11.221)	(11.003)
Constant	41.873*		−172.259
	(21.138)		(997,305.100)
Observations	57	57	57
R^2	0.717	0.610	0.610
Adjusted R^2	0.696	0.563	0.580
F Statistic	33.013*** (df = 4; 52)	19.532*** (df = 4; 50)	20.314*** (df = 4; 52)
Note:			*p<0.1; **p<0.05; ***p<0.01

Hausman test

`Hausman Test`

data: demo ~ log(gdppc) + log(pe) + log(mr) + log(gi) chisq = 4.6666e-19, df = 4, p-value = 1 alternative hypothesis: one model is inconsistent

results

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Table 6: Regression results

	Dependent variable:		
	demo		
	(1)	(2)	(3)
log(gdppc)	−0.644	−1.496	−1.496
	(1.393)	(1.424)	(1.396)
log(pe)	−1.103**	15.793***	15.793***
	(0.456)	(4.012)	(3.934)
log(mr)	−6.886**	−12.087***	−12.087***
	(3.062)	(3.176)	(3.114)
log(gi)	−39.075***	−28.940**	−28.940**
	(10.914)	(11.221)	(11.003)
Constant	41.873*		−172.259
	(21.138)		(997,305.100)
Observations	57	57	57
R^2	0.717	0.610	0.610
Adjusted R^2	0.696	0.563	0.580
F Statistic	33.013*** (df = 4; 52)	19.532*** (df = 4; 50)	20.314*** (df = 4; 52)
Note:			*p<0.1; **p<0.05; ***p<0.01

Oneway (individual) effect Within Model

Call: plm(formula = demo ~ log(gdppc) + log(pe) + log(mr) + log(gi), data = dfpanel, model = “within”, index = c(“country”, “year”))

Unbalanced Panel: n=3, T=17-21, N=57

Residuals : Min. -3.160 1st Qu. -1.560 Median -0.584 3rd Qu. 0.730 Max. 8.200

Coefficients : Estimate log(gdppc) -1.4964 log(pe) 15.7935 log(mr) -12.0870 log(gi) -28.9397 Std. Error log(gdppc) 1.4239 log(pe) 4.0120 log(mr) 3.1755 log(gi) 11.2214 t-value log(gdppc) -1.0509 log(pe) 3.9366 log(mr) -3.8063 log(gi) -2.5790 Pr(>|t|) log(gdppc) 0.2983644 log(pe) 0.0002560 log(mr) 0.0003859 log(gi) 0.0128989

log(gdppc)
log(pe) ***log(mr)*** log(gi) *
— Signif. codes:
0 ‘***’ ***0.001*** ’’ *0.01* ” 0.05 ‘.’ 0.1 ‘’ 1

Total Sum of Squares: 788.23 Residual Sum of Squares: 307.59 R-Squared: 0.60977 Adj. R-Squared: 0.56294 F-statistic: 19.5324 on 4 and 50 DF, p-value: 9.8562e-10

$$democratization = -1.496log(gdppc) + 15.793log(pe) - 12.087log(mr) - 28.940log(gi) + \alpha_i$$

where a_i represents panel specific effects

Conclusion

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