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# The Nonlinear Impact of Political Institutional Quality on Financial Inclusion

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**Abstract:** *This study investigates the nonlinear relationship between political institutions and financial inclusion in a panel of 74 developing countries using annual data from 2007 to 2016. This study uses the financial inclusion index and two components of financial inclusion, namely access and availability to financial services. The estimated model using the generalized method of moments (GMM) system (SYS-GMM) revealed that democracy has a significant U-shaped impact on the financial inclusion index, and access to and availability of financial services. However, a similar effect on the index of financial inclusion is not robust to the removal of outliers. Overall, the findings confirm that a better quality of political institutions, i.e., when it exceeds an inflection/threshold point, would lead to a higher degree of financial inclusion – as captured by the access and availability of financial services, for example the number of deposit accounts, automated teller machines (ATM), and bank branches. Our finding of the U-shaped impact on overall financial inclusion indicators are robust to outliers. The implication is that countries with a better quality of political institutions are predicted to be associated with high levels of financial inclusion. Whereas, countries with a low quality of (democratic) political institutions hinder the delivery of financial inclusion.*

***Keywords:*** Political institutions; Financial inclusion; Hierarchy of institutional hypothesis; SYS-GMM.
***JEL Classification:*** G00, G21, O16, E02

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## 1. Introduction

Financial inclusion has been singled out as one of the most important factors that can contribute to macro-economic performance, such as, economic growth (Sarma & Pais, 2010), poverty reduction and income inequality (Chibba, 2009; Manji, 2010). Hence, improving financial inclusion is a concern for policy makers in developed and developing countries (Financial Inclusion Action Plan, 2014). Sarma and Pais (2010) define financial inclusion as the process which ensures access, availability and usage of the formal financial system for all members of an economy. It indicates the provision of financial services at reasonable cost for all. Therefore, institutional quality, which ensures the security of property rights and provides a better environment for economic agents to participate in the mainstream financial system, plays an essential role in reducing transaction costs and delivering financial services. For instance, sound institutional quality with good corporate governance and less expropriation activities, encourages people to deposit their earned income into banks. At the same time, the latter will provide loans and other financial services, hence, financial inclusion will be increased. However, in countries with low levels of institutional quality, such as dictatorships, in which narrow elites control political decisions, financial development may be obstructed to deny financial access to potential competitors (Girma & Shortland, 2007). Therefore, institutional quality plays a very important role in financial inclusion.

Institutional quality affects financial inclusion in two different ways. The first concerns the demand side, which refers to the population, whereas, the second concerns the supply side, which is related to banks. First, institutions ensure the protection of property rights and reliable contract enforcement, hence an unstable political environment cannot reliably protect investors (Roe & Siegal, 2011). Therefore, it may discourage people from depositing their additional income into formal banks due to the fear of massive losses; the latter action increases the level of financial exclusion. Second, the quality of institutions that shape the role of financial intermediaries plays an essential role in the provision of financial services to the population (Rojas-Suarez, 2010). Countries with better and stronger creditor protections are associated with longer maturities and lower interest rates (Qian & Strahan, 2007).

Institutional quality is broad and is composed of economic and political institutions (Acemoglu et al., 2005). Yet, the question remains, which institutional dimension is more important for the financial process? According to the hierarchy of institutional hypothesis (HIH) proposed by Acemoglu et al. (2005), the "political institution" is the core dimension of the institutional matrix, hence the "political institution" sets the stage in which economic institutions can be devised and economic policies implemented (Flachaire et al., 2014; Li et al., 2016; Slesman et al., 2019). One issue that is sidestepped in the previous studies is the role of institutional quality, specifically regarding political institutions, on financial inclusion. There are few studies that have examined the impact of political institutions on financial inclusion by adopting HIH. Therefore, this study attempts to contribute to previous studies on the role of political institutions in facilitating financial inclusion in developing countries.

This article makes several contributions to the literature. First, we address a composite index of financial inclusion and the financial inclusion components. While previous studies use access to financial services as an indicator of financial inclusion, we suggest that access to finance is just one component of financial inclusion. Therefore, we address the scarcity of studies that have examined financial inclusion indices in general and its components separately. The motivation of this study is to further extend comprehensively and empirically financial inclusion's components and its index, and their linkage with political institution quality. This study has utilised the financial inclusion index composed by Sarma and Pais (2010), which is adopted by the Central Bank of Brazil to compute Indicators of Financial Integration (IFI) for various regions of Brazil (Banco Central Do Brasil, 2011). Second, previous literature has examined the nonlinear relationship between institutional quality and financial development (Law & Azman-Saini, 2012), however there are few studies on the nonlinear context of political institution-financial inclusion relationships. Third, previous studies deal with institutional quality as a single category and have ignored the HIH hypothesis. It is well established that political institutions are the core of other institutional dimensions, such as economic institutions (Flachaire et al., 2014; Li et al., 2016; Slesman et al., 2019), therefore, this motivates this study to highlight the role of the HIH hypothesis in its nonlinearity impact on financial inclusion. Accordingly, this study contributes to this nexus through the application of a nonlinear approach

towards the effect of political institution type on financial inclusion.

The remainder of this article is organised as follows: Section 2 gives a review of related literature on institutional quality and financial inclusion. Section 3 outlines the materials and methods used in the study. Section 4 presents findings and gives a discussion of the results. Section 5 concludes and provides policy recommendations.

## 2. Literature Review

Theoretical literature on the link of institution and finance is well established (La Porta et al., 1997, 1998, and 2000). However, this link is focused on financial development and not on financial inclusion. Legal and finance theory focus on the role of legal institutions in explaining international differences in financial development. The first part of legal and finance theory holds that in countries where legal systems enforce private property rights, support private contractual arrangements, and protect the legal right of investors, savers are more willing to finance firms and financial markets flourish. In contrast, legal institutions that neither support private property rights nor facilitate private contracting inhibit corporate finance and stunt financial development.

Focus on the institutional quality-financial inclusion nexus is lacking in the literature, with most studies focusing on financial development (*i.e.* Girma & Shortland, 2007; Huang, 2010; Law & Azman-Saini, 2012). Importantly, Girma & Shortland (2007) point out that government stability and a country's political regime (democratic or autocratic) have a significant impact on financial development and particularly on the banking sector. More democratic political systems tend to have faster financial development, however, countries that are not fully democratic have a lower probability of having liberal banking systems and capital accounts, and this probability decreases with increasing democratisation. Also, regime stability is a significant explanatory factor in determining the speed of financial development. Similarly, Huang (2010) using different methods of estimation including System Generalized Method of Moments (GMM) and Least Square Dummy Variable (LSDV) on 90 countries, found that political institutions are positively significant for financial development in both the long and short terms. Girma and Shortland (2007) provided some summary statistics of the speed of financial development and the degree of democracy

and political stability. They indicated that countries with the fastest financial development are considerably more democratic and stable than the median ones, meanwhile countries that experience financial distortions are autocratic and/or have political instability.

Another significant work in the context of political economy is Osili and Paulson (2006). They highlighted that immigrants who come from countries with institutions that are more effective at protecting property rights are more likely to participate in the United States (US) financial system. Protection from expropriation activities explains the lower financial market participation rates of immigrants, thus, better institutional quality in the home country is more likely to induce immigrants to the use formal financial system in the host country. In another related study, Law and Azman-Saini (2012) examined the impact of institutional quality on two indicators of financial development: the banking sector and stock market indicators across developed and developing countries using a dynamic GMM estimator. Their finding shows that a high quality of institutions improves financial development, specifically for banking sector indicators, while stock market indicators have been shown to have a nonlinear relationship with institutional quality. More recently, Slesman et al., (2019) examined the threshold impact of political institutions on the finance-growth nexus in a panel of 77 emerging markets and developing countries over the period 1976 to 2010. Their study used three main measures of political institutions, namely political rights (PR), civil liberties (CL), and the average of PR and CL as a threshold variable in examining the growth effects of financial development. Their results found that more finance would be translated into more growth in good quality political institutions.

While the study of Qian and Strahan (2007) mainly focused on the institutional impact of bank loans in 43 countries, their study indicated that strong creditor rights seem to enhance loan availability as lenders are more willing to provide credit. For instance, where creditor protection is strong, bank loans tend to have a longer maturity rate and a lower interest rate. In addition, this study's main focus is on formal institutions such as the legal system, however some other literature has focused on informal institutions, which refers to social capital, such as trust and culture in society. For instance, Calderon et al. (2002) examined trust's role on financial depth and efficiency for a cross-section of countries during the period 1980 to 1995. Their result evidenced that, economically, trust has a large positive effect on

the size and activity of banks. They demonstrated that countries with weak law enforcement (formal institutions), trust works as a complement to the formal institutions and would have a higher impact on financial performance.

This idea was investigated further in Williamson (2009), which suggests that, informal norms play a significant role in economic outcomes, and its role is still crucial in economies that have good formal roles. He concluded that countries which fall strongly into both the formal and informal categories experience much higher levels of development than those that have strong formal and weak informal institutions. The countries in which governments have imposed formal institutions without consideration for informal institutions are the poorest among the sample of countries in his study. Knack and Keefer (1997) have shown the importance of trust on overall economic performance, specifically on contract enforcement and savings decisions, where trust works as a collateral between peoples and hence facilitates access to credit availability in a society (see, Ojong, 2017; Guiso et al., 2004; Karlan, 2007; Aggarwal & Goodell, 2014).

According to the previously referenced literature, among others, the institutional quality-financial development link has been widely examined, while the institutional quality-financial inclusion link has not been well discussed. Also, the literature has indicated that institutional quality impacts on financial development, more specifically on bank-base compared with market-base, which financial inclusion is heavily linked with. Therefore, this study attempts to fill this gap by analysing the institutional quality-financial inclusion nexus that would make a significant contribution to previous studies. In addition, this study augments the HIH hypothesis that deals with institutional matrix preferences, and attempts to provide empirical examination on the impact of political institutions on financial inclusion.

## 3. Materials and Methods

### *3.1. Financial inclusion model*

The goal of this paper is to examine the effect of political institutions on financial inclusion in developing countries. Thus, the empirical model augmented from Sarma and Pais (2010) in this analysis is as follows:

$$lnFI_{it} = \alpha + \beta_1 lnFI_{i,t-1} + \beta_2 lnPOL_{it} + \beta_3 lnGDP_{it} + \beta_4 X'_{it} + v_i + \eta_t + u_{it} \quad (1)$$

Where subscript *i* and *t* are the country and time index, respectively, *FI* is financial inclusion (in this study we use four proxies, namely bank account [*AC*], Automated Teller Machines (*ATM*), bank branch (*BB*), and financial inclusion index [*FII*]). Therefore, equation (1) can be transformed into four sub equations with the substitution of *FI* by bank account (*AC*), ATM, bank branch (*BB*), and financial inclusion index (*FII*). *POL* denotes political institution, which is proxied by level of democracy (*Demo*), and it is widely used in the literature to indicate the political institutions (Slesman et al., 2015; Williams, 2017; Acemoglu et al., 2005). *GDP* is gross domestic product per capita, and *X*' stands for vector of control variables hypothesised to affect *FI*, $v_i$ is the country-specific effect, $\eta_t$ is the time-specific effect, and $u_{it}$ is the error term. To evaluate the non-linear relationship between institutional quality and *FI*, the squared term of democracy $\left(Demo_{it}^2\right)$ is included in the model specification to capture the non-linear effect of political institutions and *FI,* and to determine the U-shaped or inverted U-shaped relationship. Law and Azman-Saini (2012) used the squared term of institutional quality on its effect on financial development, also some studies hypothesised that institutions have an indirect effect on finance (Girma & Shortland, 2007). Therefore, the squared term of democracy is included in the model specification as follows:

$$lnAC_{it} = \alpha + \beta_1 lnAC_{i,t-1} + \beta_2 lnDemo_{it} + \beta_3 lnDemo_{it}^2 + \beta_4 lnGDP_{it} + \beta_5 X'_{it} + v_i + \eta_t + u_{it} \quad (2)$$

$$lnATM_{it} = \alpha + \beta_1 lnATM_{i,t-1} + \beta_2 lnDemo_{it} + \beta_3 lnDemo_{it}^2 + \beta_4 lnGDP_{it} + \beta_5 X'_{it} + v_i + \eta_t + u_{it} \quad (3)$$

$$lnBB_{it} = \alpha + \beta_1 lnBB_{i,t-1} + \beta_2 lnDemo_{it} + \beta_3 lnDemo_{it}^2 + \beta_4 lnGDP_{it} + \beta_5 X'_{it} + v_i + \eta_t + u_{it} \quad (4)$$

$$lnFII_{it} = \alpha + \beta_1 lnFII_{i,t-1} + \beta_2 lnDemo_{it} + \beta_3 lnDemo_{it}^2 + \beta_4 lnGDP_{it} + \beta_5 X'_{it} + v_i + \eta_t + u_{it} \quad (5)$$

The GMM proposed by Holtz-Eakin et al. (1988) and extended by Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998) is applied. The estimation is carried out using the System GMM (SYS-GMM) estimator on a panel of 74 developing and emerging economies

over the period 2007 to 2016. In addition, diagnostic tests are applied to confirm the reliability of augmented results, hence two diagnostic tests are used based on Arrelano and Bond (1991) to assess the first and second order serial correlation in the errors. The rule of thumb suggests that the first order serial correlation could be rejected, but it cannot be rejected for the second order. The second test is Sargan/Hansan to test the issue of over identification, which is caused by many instruments that would lead to bias estimation. Additionally, the U-test is applied to test the existence and the presence of a U-shaped (or inverse U-shaped) relationship on an interval.

We use the System GMM estimator (Blundell and Bond, 1998) as our preferred estimation because it is consistent in parameter estimates and unbiased compared to the pooled ordinary least squares (OLS), within groups (fixed effect), and difference GMM estimators. The System GMM can handle endogeneity because it provides more efficient estimates than other options such as difference GMM or fixed effect models. Another reason for preferring a System GMM over pooled OLS and dynamic fixed effect estimations is the bias, which suggests that the correlation between the lagged dependent variable and the specific fixed effect may be biased if the coefficient on the lagged dependent variable tends toward zero. The bias is especially relevant for models with shorter time dimensions. According to Bond et al. (2001), the coefficient on the lagged dependent variable obtained with pooled OLS is biased upward and the within-groups estimator is biased downward. Before presenting the empirical results, this study will verify the above properties that motivate us to use the System GMM estimator.

GMM estimators have two variants, the one-step and two-step estimators. Theoretically, the two-step estimator is more efficient than the one-step estimator because it uses optimal weighting matrices. However, note that its application to a sample with a small cross-section dimension may lead to biased standard errors, biased estimated parameters (Windmeijer, 2005), and a weakened over-identification test (Bowsher, 2002). Roodman (2009a) shows that the cause of these problems is instrument proliferation or too many instruments. The author proposes an innovative solution that reduces the dimensionality of the instrumental variable matrix. Following Roodman (2009b), the dimensionality of the instrumental variable matrix is reduced. Because the regressors are likely to be endogenous, they should all be instrumented with two lags of themselves in the first-difference equation and one lag of the first-difference in the level equation.

### *3.2. Data source*

Data for the variables used in the analysis were taken from the Penn World Tables (PWT, version 7.1), Financial Access Survey (FAS), the database of the International Monetary Fund (IMF) (Sarma, 2016), and the World Bank's World Development Indicators (WDI). The dependent variable 'financial inclusion', proxied by the accessibility of financial services, has been measured by the penetration of the banking system, proxied by the number of bank accounts per 1,000 of the population. Availability has been measured by the number of commercial bank branches and the number of ATMs per 100,000 people, obtained from the Financial Access Survey (FAS) database of the IMF. The proxy used for the financial inclusion index is taken from Sarma & Pais (2010). Democracy is re-scaled with the maximum score of 0 for full autocracy and a maximum score of 10 for full democracy, data obtained from the Centre of International Development and Conflict Management, University of Maryland (polity IV). Where GDP per capita is the gross domestic product divided by midyear population (constant 2010 US$). Also, human capital's proxy is life expectancy at birth, total (years), the data were taken from Worldwide Governance Indicators (WGI). Government expenditure (GOE) is the general government final consumption expenditure (% of GDP). In addition, openness is defined as the sum of exports and imports divided by GDP, the data of trade openness is obtained from the World Bank.

From Table 1, the standard deviations for financial inclusion components and indexes, and democracy are quite scattered around the means. This implies that the variation in these variables is resilient across our cross-sectional sample. A high standard deviation indicates that the data is spread out of the means. In addition, Table 2 presents a simple correlation analysis of the variables included in the model. The correlation coefficient between democracy and bank account, ATM, bank branches, and financial inclusion index is 0.35, 0.28, 0.24, and 0.42 respectively. Where the highest correlation recorded between democracy and financial inclusion at 0.42. It worth noting that, all financial inclusion components and the index positively correlated with the rest of the variables. This indicates that the variables that are included in the model positively impact financial inclusion, or in other words, they have positive correlation with financial inclusion. The significance of this correlation is further examined using

SYS-GMM approach. Also, human capital has the highest correlation with financial inclusion compared with the rest of the control variables. This indicates that the more educated people in the country, the more inclusion in financial services. Educated people are associated with better usage of financial services such as mobile banking, online transactions and having bank accounts and other financial services.

**Table 1**: Descriptive Statistics

| Variable | Obs | Mean | Std Dev | Min | Max |
|---|---|---|---|---|---|
| AC | 694 | 928.898 | 880.422 | 11.89 | 5302.61 |
| BB | 717 | 15.023 | 21.509 | 0.473 | 257.696 |
| ATM | 714 | 34.012 | 39.832 | 0 | 289 |
| FII | 544 | 0.352 | 0.214 | .015 | 0.876 |
| DEMO | 740 | 7.151 | 2.705 | 0 | 10 |
| HC | 740 | 68.279 | 7.399 | 45.552 | 79.831 |
| OPN | 740 | 84.937 | 35.317 | 22.106 | 311.355 |
| GDP | 740 | 1.83e+11 | 3.98e+11 | 5.10e+08 | 2.50e+12 |
| GOE | 736 | 15.278 | 5.197 | 2.047 | 38.434 |

Notes: N = 74 cross-country. T = 2007 – 2016. All statistics are based on original data values. Bank account= AC; bank branch= BB; financial inclusion index= FII; democracy= Demo; human capital= HC; openness= OPN; gross domestic product= GDP; government expenditure= GOE.

**Table 2**: Correlation Matrix

| Variables | DEMO | AC | ATM | BB | FII | GDP | HC | OPN | GOE |
|---|---|---|---|---|---|---|---|---|---|
| DEMO | 1.000 | | | | | | | | |
| AC | 0.349 | 1.000 | | | | | | | |
| ATM | 0.283 | 0.789 | 1.000 | | | | | | |
| BB | 0.242 | 0.321 | 0.301 | 1.000 | | | | | |
| FII | 0.426 | 0.855 | 0.679 | 0.414 | 1.000 | | | | |
| GDP | 0.159 | 0.283 | 0.433 | 0.040 | 0.256 | 1.000 | | | |
| HC | 0.271 | 0.495 | 0.443 | 0.382 | 0.599 | 0.209 | 1.000 | | |
| OPN | 0.009 | 0.192 | 0.141 | 0.051 | 0.184 | -0.304 | 0.113 | 1.000 | |
| GOE | 0.149 | 0.118 | 0.157 | 0.097 | 0.117 | -0.071 | -0.085 | 0.248 | 1.000 |

## 4. Results and Discussion

The results of political institutions' impact on financial inclusion is discussed in Table 3, where democracy is our main variable representing political institutions. The results highlighted the nonlinear effect of political institution type (democracy) on four proxies of financial inclusion, namely *AC*, *ATM*, *BB*, and *FII*[1]. Model (1) represents the effect of democracy on access to financial inclusion (bank account), where models (2) and (3) examine the effect of democracy on availability of financial inclusion (ATM and bank branch), and the last is model (4), which represents the effect of democracy on financial inclusion index computed by Sarma (2008). The results confirm the existence of a U-shape relationship on financial inclusion for all models, including access to financial inclusion, availability for financial inclusion, and on the financial inclusion index. This indicates that more democratic countries tend to facilitate financial inclusion services for the population, whereas countries with a less democratic system tend to have higher financial exclusion.

The finding shows that the value of the inflection or threshold point for AC is 1.327 (or a 3.77 score on the democracy index without log), which is below the sample mean of 2.007. Democratic countries scoring below this estimated threshold point would be categorised as low-democracy regimes, while those who surpass this threshold value are categorised as high-democracy regimes. The threshold point recorded lowest in bank branch compared with access and financial inclusion index, which is recorded at 1.126 (3.08) and highest at 1.327 (3.77). This indicates that access dimensions need a higher threshold point of democracy compared with both availability dimensions and financial inclusion indices. In general, the average democracy range should be around the 3.35 level of democracy, which is considered to be not very high because it is half the mean democracy level (7.15). Notably, the threshold value of this study is consistent with the threshold value of Law and Azman-Saini (2012). Their threshold value is recorded at 16.96 over 50 (institutional quality measurement ranges from 0 to 50), which is near to this study level at 3.08 over 10 (institutional quality measurement ranges from 0 to 10) if the scale is unified.

The results are supported by previous literature, which has argued that institutional quality is crucial to enhance financial access to the population

(Girma & Shortland, 2007; Chinn & Ito, 2006; Aggarwal & Goodell, 2014). Furthermore, the results show the existence of differential financial inclusion effects between low and high political institution types. Countries with democracy surpassing an optimum score, benefit less compared with countries falling below an optimum score. For instance, the coefficient of democracy in model (1) is -2.336 of countries below an optimum score, while it is just 0.880 for countries falling above an optimum score. This indicates that the negative impact of democracy on financial inclusion is doubled compare with its positive impact on financial inclusion. In other words, countries would gain less in a high-democracy regime compared to countries of low-democracy regime. This result is supported by results of Law and Azman-Saini (2012). Their study found that the coefficient of negative effects on institutions below the threshold is greater than its positive impact.

### *4.1. Robust check*

Cook's Distance Outlier test[2] is applied to detect the outliers. A regression outlier is an observation with an unusual value of the dependent variable Y, conditional on its value of the independent variable X. Table 4 below shows the political institution-financial inclusion link after removing outliers. After removing outliers, the results show that democracy impacts financial inclusion and has a nonlinear process, and the optimum threshold point is slightly lower than the full sample before removing outliers. Only the bank branches are slightly increased, which recorded at 1.155 after outliers, however it was 1.126. In addition, the signs for the control variables remain the same, which indicates that the obtained results are consistent before and after removing outliers. The coefficients of our interest variables of democracy and democracy squared have slightly increased in all the models. The financial inclusion index shows no significant results although outliers are removed from the model. This confirms that components of financial inclusion behave differently than the index, which suggests caution in dealing with the financial inclusion index without looking deep into its components.

**Table 3**: Effect of Democracy on Financial Inclusion

| | **AC** | **ATM** | **BB** | **FII** |
|---|---|---|---|---|
| | Model(1) | Model(2) | Model(3) | Model(4) |
| Constant | -1.6145*** | -3.1349** | 4.5085*** | 1.0490*** |
| | (0.4802) | (1.2445) | (0.3825) | (0.2133) |
| $lFI_{t-1}$ | 0.9016*** | 0.8559*** | 1.0025*** | 1.0968*** |
| | (0.0080) | (0.0189) | (0.0077) | (0.0439) |
| lDEMO | -2.3360** | -3.8038*** | -2.3152** | -0.9911* |
| | (0.9413) | (0.7198) | (0.9076) | (0.5081) |
| $lDEMO^2$ | 0.8798** | 1.6293*** | 1.0276*** | 0.4308** |
| | (0.4094) | (0.3174) | (0.3930) | (0.2186) |
| lGDP | -0.0058 | 0.0349*** | -0.0258*** | -0.0051 |
| | (0.0095) | (0.0096) | (0.0081) | (0.0046) |
| lHC | 0.7825*** | 0.9889*** | -0.5115*** | -0.0663* |
| | (0.0780) | (0.2881) | (0.0752) | (0.0400) |
| lOPN | 0.1784*** | 0.0607* | -0.1972*** | -0.0718*** |
| | (0.0220) | (0.0342) | (0.0147) | (0.0121) |
| lGOE | -0.0823*** | -0.0229* | -0.0128** | 0.0147 |
| | (0.0148) | (0.0130) | (0.0065) | (0.0091) |
| AR(2) (p-value) | 0.101 | 0.183 | 0.612 | 0.893 |
| J-test (p-value) | 0.139 | 0.215 | 0.136 | 0.550 |
| U-test | 1.327** | 1.167*** | 1.126*** | 1.150** |
| No. of Instruments | 51 | 58 | 58 | 37 |
| No. of Countries | 74 | 74 | 74 | 74 |
| No. of Observations | 616 | 636 | 639 | 468 |
| Time dummies | No | Yes | Yes | Yes |

Note: Standard errors are in parenthesis *** p<0.01, ** p<0.05, * p<0.1

**Table 4**: Robust Check of Effect of Democracy on Financial Inclusion without Outliers

| | **Bank Account (AC)** | **ATM** | **Bank Branch (BB)** | **Financial inclusion index (FII)** |
|---|---|---|---|---|
| | Model(1) | Model(2) | Model(3) | Model(4) |
| Constant | -1.8980*** | -1.2637 | 0.2522 | 0.8468*** |
| | (0.3523) | (0.8341) | (0.4428) | (0.2289) |
| $lFI_{t-1}$ | 0.8930*** | 0.9145*** | 0.8433*** | 1.0705*** |
| | (0.0085) | (0.0127) | (0.0101) | (0.0446) |
| lDEMO | -2.6808*** | -4.3274*** | -3.2650*** | -0.7796 |
| | (0.7350) | (1.0734) | (0.9032) | (0.5092) |
| $lDEMO^2$ | 1.0383*** | 1.8918*** | 1.4123*** | 0.3382 |
| | (0.3162) | (0.4692) | (0.3874) | (0.2189) |
| lGDP | -0.0050 | 0.0218** | -0.0353*** | -0.0028 |
| | (0.0100) | (0.0088) | (0.0086) | (0.0044) |
| lHC | 0.9262*** | 0.5835*** | 0.6831*** | -0.0528 |
| | (0.0624) | (0.1463) | (0.0945) | (0.0372) |
| lOPN | 0.1365*** | 0.0820*** | -0.1579*** | -0.0706*** |
| | (0.0216) | (0.0230) | (0.0152) | (0.0130) |
| lGOE | -0.0858*** | -0.0337** | 0.0231*** | 0.0197** |
| | (0.0128) | (0.0139) | (0.0080) | (0.0092) |
| AR(2) (p-value) | 0.109 | 0.175 | 0.884 | 0.602 |
| J-test (p-value) | 0.132 | 0.250 | 0.124 | 0.420 |
| U-test | 1.290*** | 1.143*** | 1.155*** | 1.152* |
| No. of Instruments | 51 | 58 | 58 | 37 |
| No. of Countries | 74 | 74 | 73 | 74 |
| No. of Observations | 600 | 596 | 611 | 462 |
| Time dummies | No | Yes | Yes | Yes |

Note: Standard errors are in parenthesis *** p<0.01, ** p<0.05, * p<0.1

## 5. Conclusion

In this article, we have examined the relationship between political institutions and financial inclusion in developing countries. More specifically, we have addressed a number of related questions. What is the nature of the impact of political institution type on financial inclusion components and the financial inclusion index? Do financial inclusion components have similar or dissimilar effects? Using data from 74 developing countries over the period 2007 to 2016, we use the SYS-GMM estimator to examine this relationship. The results confirm an existing U-shaped relationship between political institution type and the financial inclusion index, also between political institution type and the dimensions of financial inclusion. This confirms that a higher level of democracy tends to facilitate financial inclusion. Therefore, the findings support the view that institutional quality plays an indirect effect on economic outcomes, with countries having an institutional quality higher than the optimum point gaining significantly from the inclusion of financial services.

The outcomes of the empirical examination suggest that democracy's U-shaped effect tends to diminish financial inclusion before the turning point, with greater impacts compared with its positive impact after the turning point. This is particularly crucial for countries with a democracy level below the optimum level, thus reform action should be taken to improve democracy above the threshold. One policy implication is that a sufficiently high quality of democratic political institutions is a crucial determinant of the widespread inclusion of financial services to the larger segment of the population. The recommendation that emerges from this study is that to increase financial inclusion (and financial deepening) requires structural reforms to improve the quality of political institutions to a sufficient level. Such policy efforts can potentially have large payoffs not only in terms of traditional financial access but perhaps also in terms of online financial inclusion.

## Notes

[1] The index has been computed by Sarma (2008), which ranges between 0 and 1, where 0 indicates financial exclusion, and 1 indicates the highest financial inclusion. Central Bank of Brazil has adopted the methodology from Sarma and Pais (2010) to compute IFI for various regions of Brazil (Sarma, 2012).

[2] Cook's D measures the 'distance' between Bj and Bj(-i) by calculating an F-test for the hypothesis that βj = Bj(-i), for j = 0,1,…,k. An F statistic is calculated for each observation as follows: $D_i = \frac{E_i'^2}{K+1} \times \frac{h_i}{1-h_i}$ where hi is the hat-value for each observation and $E_i'^2$ is the standardized residual. The first fraction measures discrepancy; the second measures leverage. There is no significance test for *D i* (*i.e., the F value here measures only distance) but a cut-off-rule of thumb is:* $D_i > \frac{4}{n-k-1}$ (Law et al., 2018).

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## Appendix

**Table 1A**: Covariance Matrix of Bank Account

| e(V) | lAC | lDEMO | lDEMO$^2$ | lGDP | lHC | lOPN | lGOE | _cons |
|---|---|---|---|---|---|---|---|---|
| $lAC_{t-1}$ | 0.000 | | | | | | | |
| lDEMO | 0.000 | 0.886 | | | | | | |
| lDEMO$^2$ | -0.000 | -0.385 | 0.168 | | | | | |
| lGDP | -0.000 | -0.002 | 0.001 | 0.000 | | | | |
| lHC | -0.000 | 0.013 | -0.006 | -0.000 | 0.006 | | | |
| lOPN | -0.000 | 0.003 | -0.001 | 0.000 | 0.000 | 0.000 | | |
| lGOE | -0.000 | 0.002 | -0.001 | 0.000 | 0.000 | 0.000 | 0.000 | |
| cons | 0.001 | -0.359 | 0.158 | 0.000 | -0.021 | -0.005 | -0.003 | 0.231 |

**Table 2A**: Covariance Matrix of Bank Branches

| e(V) | lBB | lDEMO | lDEMO$^2$ | lGDP | lHC | lOPN | lGOE | _cons |
|---|---|---|---|---|---|---|---|---|
| $lBB_{t-1}$ | 0.000 | | | | | | | |
| lDEMO | 0.001 | 0.499 | | | | | | |
| lDEMO$^2$ | -0.000 | -0.214 | 0.092 | | | | | |
| lGDP | -0.000 | 0.000 | -0.000 | 0.000 | | | | |
| lHC | -0.000 | -0.029 | 0.012 | -0.000 | 0.008 | | | |
| lOPN | -0.000 | -0.001 | 0.000 | 0.000 | -0.000 | 0.000 | | |
| lGOE | -0.000 | 0.001 | -0.000 | 0.000 | -0.000 | 0.000 | 0.000 | |
| cons | 0.001 | -0.093 | 0.040 | -0.001 | -0.017 | -0.001 | 0.000 | 0.134 |

**Table 3A**: Covariance Matrix of ATM

| e(V) | lATM | lDEMO | $lDEMO^2$ | lGDP | lHC | lOPN | lGOE | _cons |
|---|---|---|---|---|---|---|---|---|
| $lATM_{t-1}$ | 0.000 | | | | | | | |
| lDEMO | 0.009 | 1.079 | | | | | | |
| $lDEMO^2$ | -0.004 | -0.478 | 0.212 | | | | | |
| lGDP | 0.000 | 0.006 | -0.003 | 0.000 | | | | |
| lHC | -0.005 | -0.182 | 0.081 | -0.001 | 0.077 | | | |
| lOPN | 0.000 | 0.005 | -0.002 | 0.000 | -0.002 | 0.001 | | |
| lGOE | 0.000 | 0.001 | -0.001 | -0.000 | 0.000 | 0.000 | 0.000 | |
| cons | 0.014 | 0.202 | -0.090 | -0.001 | -0.216 | 0.003 | -0.001 | 0.823 |

**Table 4A**: Covariance Matrix of ATM

| e(V) | $lFII_t$ | lDEMO | $lDEMO^2$ | lGDP | lHC | lOPN | lGOE | _cons |
|---|---|---|---|---|---|---|---|---|
| $lFII_{t-1}$ | 0.002 | | | | | | | |
| lDEMO | -0.005 | 0.258 | | | | | | |
| $lDEMO^2$ | 0.002 | -0.111 | 0.048 | | | | | |
| lGDP | -0.000 | 0.000 | -0.000 | 0.000 | | | | |
| lHC | 0.000 | -0.011 | 0.005 | -0.000 | 0.002 | | | |
| lOPN | -0.000 | 0.002 | -0.001 | 0.000 | -0.000 | 0.000 | | |
| lGOE | -0.000 | 0.002 | -0.001 | 0.000 | -0.000 | 0.000 | 0.000 | |
| cons | 0.004 | -0.078 | 0.033 | -0.000 | 0.001 | -0.001 | -0.001 | 0.046 |

## After removing outliers

**Table 1B**: Covariance Matrix of Bank Account

| e(V) | lAC | lDEMO | $lDEMO^2$ | lGDP | lHC | lOPN | lGOE | _cons |
|---|---|---|---|---|---|---|---|---|
| $lAC_{t-1}$ | 0.000 | | | | | | | |
| lDEMO | 0.001 | 0.540 | | | | | | |
| $lDEMO^2$ | -0.000 | -0.232 | 0.100 | | | | | |
| lGDP | -0.000 | -0.001 | 0.001 | 0.000 | | | | |
| lHC | 0.000 | -0.004 | 0.001 | -0.000 | 0.004 | | | |
| lOPN | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | 0.000 | | |
| lGOE | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | |
| cons | 0.001 | -0.173 | 0.076 | -0.001 | -0.008 | -0.004 | -0.001 | 0.124 |

**Table 2B**: Covariance Matrix of Bank Branches

| e(V) | lBB | lDEMO | $lDEMO^2$ | lGDP | lHC | lOPN | lGOE | _cons |
|---|---|---|---|---|---|---|---|---|
| $lBB_{t-1}$ | 0.000 | | | | | | | |
| lDEMO | -0.001 | 0.816 | | | | | | |
| $lDEMO^2$ | 0.001 | -0.350 | 0.150 | | | | | |
| lGDP | 0.000 | 0.001 | -0.000 | 0.000 | | | | |
| lHC | -0.000 | -0.019 | 0.008 | -0.000 | 0.009 | | | |
| lOPN | 0.000 | -0.000 | 0.000 | 0.000 | -0.001 | 0.000 | | |
| lGOE | -0.000 | 0.003 | -0.001 | 0.000 | -0.000 | 0.000 | 0.000 | |
| cons | 0.001 | -0.266 | 0.114 | -0.001 | -0.017 | 0.000 | -0.001 | 0.196 |

**Table 3B**: Covariance Matrix of ATM

| e(V) | lATM | lDEMO | $lDEMO^2$ | lGDP | lHC | lOPN | lGOE | _cons |
|---|---|---|---|---|---|---|---|---|
| $lATM_{t-1}$ | 0.000 | | | | | | | |
| lDEMO | -0.005 | 1.152 | | | | | | |
| $lDEMO^2$ | 0.002 | -0.504 | 0.220 | | | | | |
| lGDP | -0.000 | 0.002 | -0.001 | 0.000 | | | | |
| lHC | -0.001 | 0.013 | -0.006 | 0.000 | 0.021 | | | |
| lOPN | 0.000 | -0.004 | 0.002 | 0.000 | -0.000 | 0.001 | | |
| lGOE | -0.000 | -0.006 | 0.003 | 0.000 | 0.001 | -0.000 | 0.000 | |
| cons | 0.008 | -0.487 | 0.214 | -0.004 | -0.103 | 0.001 | -0.002 | 0.696 |

**Table 4B**: Covariance Matrix of Financial Inclusion Index

| e(V) | $lFII_t$ | lDEMO | $lDEMO^2$ | lGDP | lHC | lOPN | lGOE | _cons |
|---|---|---|---|---|---|---|---|---|
| $lFII_{t-1}$ | 0.002 | | | | | | | |
| lDEMO | -0.006 | 0.259 | | | | | | |
| $lDEMO^2$ | 0.003 | -0.111 | 0.048 | | | | | |
| lGDP | -0.000 | 0.000 | -0.000 | 0.000 | | | | |
| lHC | 0.000 | -0.009 | 0.004 | -0.000 | 0.001 | | | |
| lOPN | -0.000 | 0.002 | -0.001 | 0.000 | -0.000 | 0.000 | | |
| lGOE | -0.000 | 0.002 | -0.001 | 0.000 | -0.000 | 0.000 | 0.000 | |
| cons | 0.005 | -0.088 | 0.038 | -0.001 | 0.001 | -0.001 | -0.001 | 0.052 |