Factors that Affect Financial Inclusion: A Cross Country Analysis

Doris Allamani
Olena Vol
Xin YU

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Abstract

Financial inclusion is a key element of social inclusion, particularly useful in combating poverty and income inequality by opening blocked advancement opportunities for disadvantaged segments of the population. This study intends to investigate the impact of financial access, information absorption and the law quality on financial inclusion, make a prediction of the lingering effects of these macro factors on it and provide actionable suggestions to the economies based on yearly 2020 cross-sectional data available on the World Bank.

Keywords: Financial Inclusion, Financial Access, Cross Country, Linear Regression

Catalog

1. Introduction

From the development of global finance, both developing and developed countries still have different degrees of financial exclusion in the 21st century, and the issue of how to build a financial inclusion system and improve the degree of financial inclusion has received more and more attention and consideration from the international community. Against this background, the World Bank released a report entitled "Building Inclusive Financial Systems" in 2004 and officially introduced the concept of Financial Inclusion System (FIS) was officially proposed by the United Nations in 2005 as an important way to effectively reduce poverty and achieve the Millennium Development Goals.

However, there are still large groups of people around the world who do not have access to formal financial services. There are still many groups around the world that do not have access to formal financial services and are missing out on significant development opportunities. In this context, a proper understanding of the existing empirical studies on the efficiency and impact of implementing financial inclusion in countries around the world, including political, economic, financial, judicial, scientific and technological, and institutional construction, is of great practical significance for the formulation of financial policies, the improvement of income distribution systems and the promotion of harmonious social development at the world level.

Therefore, this paper takes the countries for which World Bank data are available in 2020 as an example, and classifies economies into four income groups: low, lower-middle, upper-middle, and high income. Second, we determine the correlation between multiple macro factors and financial inclusion. Based on this correlation, we quantify the country-specific factors associated with the degree of financial inclusion, and the analysis of these factors helps to enhance the effectiveness of policy formulation. After that, we quantitatively analyze the impact of the factors on financial inclusion on economies in four income groups.

2. Literature Review

Financial inclusion has been defined by several studies and various measures have been proposed. The Committee on Financial Inclusion led by Rangarajan (2008) [1] defines financial inclusion as the process of ensuring access to financial services and timely and adequate credit at reasonable cost for vulnerable sectors and vulnerable groups such as low income. Central banks and financial institutions have adopted regulations and codes of practice to deepen financial inclusion in different countries. To assess financial inclusion, Amic et al. (2014) [2] used the International Monetary Fund's Financial Access Survey (FAS) database to construct a new composite index of financial inclusion; Camara and Tuesta (2014) [3] used a two-stage principal component analysis to assign weights along three dimensions: access, barriers, and use.

Adeola and Evans (2017) [4] argue that financial inclusion is a prerequisite for economic growth and diversified economic development; Swamy (2012) [5] uses empirical evidence to affirm the role of banks as financial intermediaries in promoting growth, using India as an example, and also argues that access to financial services by the poor is a prerequisite for poverty reduction and thus for sustainable growth. Babajide, Adegboye and Omankhanlen (2015) [6] found that financial inclusion is an important determinant of total factors of production as well as capital per capita, which also determines the aggregate level of economic output, using Nigeria as an example; Park and Mercado (2015; [7] Neaime and Gaysset, 2018) [8] argue that inadequate financial inclusion may have adverse effects on reducing income inequality, reducing poverty and achieving financial stability.

Some other studies have examined the determinants of financial inclusion. Uddin et al. (2017) [9] analyze the determinants of financial inclusion in terms of both supply and demand factors. On the supply side, it is argued that bank size, efficiency, and interest rates directly affect financial inclusion. On the demand side, literacy rate is positively related to financial inclusion and age dependency ratio is negatively related to financial inclusion; Karpowicz (2014) [10] argues that there are three major barriers to enhance financial inclusion: access, depth and efficiency. Barriers to access include: lack of physical infrastructure, high documentation requirements for opening, maintaining and closing bank accounts and applying for loans, and the need for red tape and informal guarantors to access financial services; barriers to depth include: barriers related to collateral requirements, information disclosure, and contract enforcement procedures; barriers to efficiency usually include: related to the state of competition and the degree of information asymmetry faced by financial institutions, and are reflected in spreads and bank overheads. If these barriers are widespread, they can lead to the exclusion of marginalized groups from the financial system.

Although most of the studies suggest links between the impact of financial inclusion on alleviating income inequality, poverty level, urban-rural development gap or

accelerating economy development, etc. Or they are exploring the measurement system of financial inclusion itself. But few of them are exploring under which given development conditions economies can more effectively and deeply promote financial inclusion policies and accelerate development efficiency. In addition, after examining the impact of various macro indices on financial inclusion implementation and development, it is relatively rare to make predictions on the extent of the impact of these indices on different regions in future development. In this paper, we analyze the national factors affecting financial inclusion in order to establish a solid empirical and empirical basis for proposing more effective policy measures to enhance financial inclusion in each country.

3. Data and Methodology

3.1 Sample and description of variables

This paper aims to investigate the role of macro impact factors in financial inclusion implement efficiency and process among all countries available in the World Bank in 2020.

We propose a cross-sectional with yearly data in 2020 obtained from the World Bank, WGI, the United Nations and OECD. Our sample is built for all the countries categorified into six geographic areas with data availability for the dependent variable Financial Inclusion measured at the percentage of respondents who ages over 15 as well as report having an account at a bank or another type of financial institution or report personally using a mobile money service in the past 12 months.

The sample we collected is built for all the countries with data availability for the dependent variable Financial Inclusion ($FINCL_i$) measured at weighted average of the percentage of respondents who report having a financial account from Global Findex.

Our key independent variables relate to impacting financial inclusion from four perspectives: financial access, regulatory effectiveness, information level and urbanization level.

Financial access is captured by business freedom ($Busfree_i$), financial freedom ($Finfree_i$) and Commercial bank branches per 100,000 adults ($Banks_i$). The business freedom score for each country is a number between 0 and 100, with 100 equaling the freest business environment. The business freedom index is based on 10 indicators, using data from the World Bank's Doing Business study: Starting a business-procedures (number), time (days), cost (% of income per capita), and minimum capital (% of income per capita); Obtaining a license—procedures (number), time (days), and cost (% of income per capita); Closing a business—time (years), cost (% of estate), and recovery rate (cents on the dollar). The financial literacy score ($Finlit_i$)is a derived value that ranges between 0 and 100. It is calculated following the methodology described in the OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion and consists of the sum of three elements, then normalize it to 100 for reporting by multiplying by 100/21: 1. Financial knowledge score (takes the range 0 to 7); 2. Financial behavior score (takes the range 0 to 9); 3. Financial attitude score (takes the range 1 to 5). The Index scores an economy's financial freedom by looking into the following five broad areas and values in the interval of 0 to 100: 1. The extent of government regulation of financial services; 2. The degree of state intervention in banks and other financial firms through direct and indirect ownership; 3. The extent of financial and capital market development; 4. Government influence on the allocation of credit; 5. Openness to foreign

competition.

Rule of law (LAW$_i$), the variable to be regarded as the index of law quality takes a value from −2.5 for weaker to +2.5 for stronger confidence. We consider a country to have weak agent confidence if its WGI value is below the threshold of 1.

Literacy rate (LIT$_i$) is considered as the variable to measure the information absorption among all different countries around the world in this paper. It is computed by dividing the number of people aged 15–24 years who are literate by the total population in the same age group, the result is then multiplied by 100.

In the study we also include variables such as Gini coefficient for inequality (gini) , percentage of people living in urban areas (urb), percentage of internet users in the population (internet), human capital index (hci).

We control for macroeconomic conditions by including Income Group (Income$_i$), which classifies economies into four income groups: low, lower-middle, upper-middle, and high income, which measures the role of the external sector on financial inclusion.

Table 1: Definistion of variables and data source

Variable	Symbol	Description	Data Sources
Financial Inclusion	$FINCL_i$	The percentage of respondents who report having an account at a bank or another type of financial institution or report personally using a mobile money service in the past 12 months.	World Bank
Literacy Rate	LIT_i	Adult literacy rate is the percentage of people ages 15 and above who can both read and write with understanding a short simple statement about their everyday life.	World Bank
Commercial bank branches	$Banks_i$	Commercial bank branches are retail locations of resident commercial banks and other resident banks that function as commercial banks that provide financial services to customers and are physically separated from the main office but not organized as legally separated subsidiaries.	International Monetary Fund (IMF)
Rule of Law	LAW_i	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	The Worldwide Governance Indicators (WGI)
Business Freedom	$Busfree_i$	Business freedom is an overall indicator of the efficiency of government regulation of business. The quantitative score is derived from an array of measurements of the difficulty of starting, operating, and closing a business.	World Bank
Financial Literacy	$Finlit_i$	Financial literacy is the ability to understand and effectively use various financial skills, including personal financial management, budgeting, and investing.	Organization for Economic Co-operation and Development (OECD)

Financial Freedom	$Finfree_i$	Financial freedom usually means having enough savings, financial investments, and cash on hand to afford the kind of life we desire for ourselves and our families. It means growing savings that enable us to retire or pursue the career we want without being driven by earning a set salary each year.	Organization for Economic Co-operation and Development (OECD)
Income Group	$Income_i$	Income group according to World Bank.	World Bank

3.2 Methodology

3.2.1 Descriptive statistics

To start our analysis, the Kernel densities with the normal distribution of all of our potentially explanatory variables displays below:

Graph 1: Kernel Density Estimation with Normal Distribution
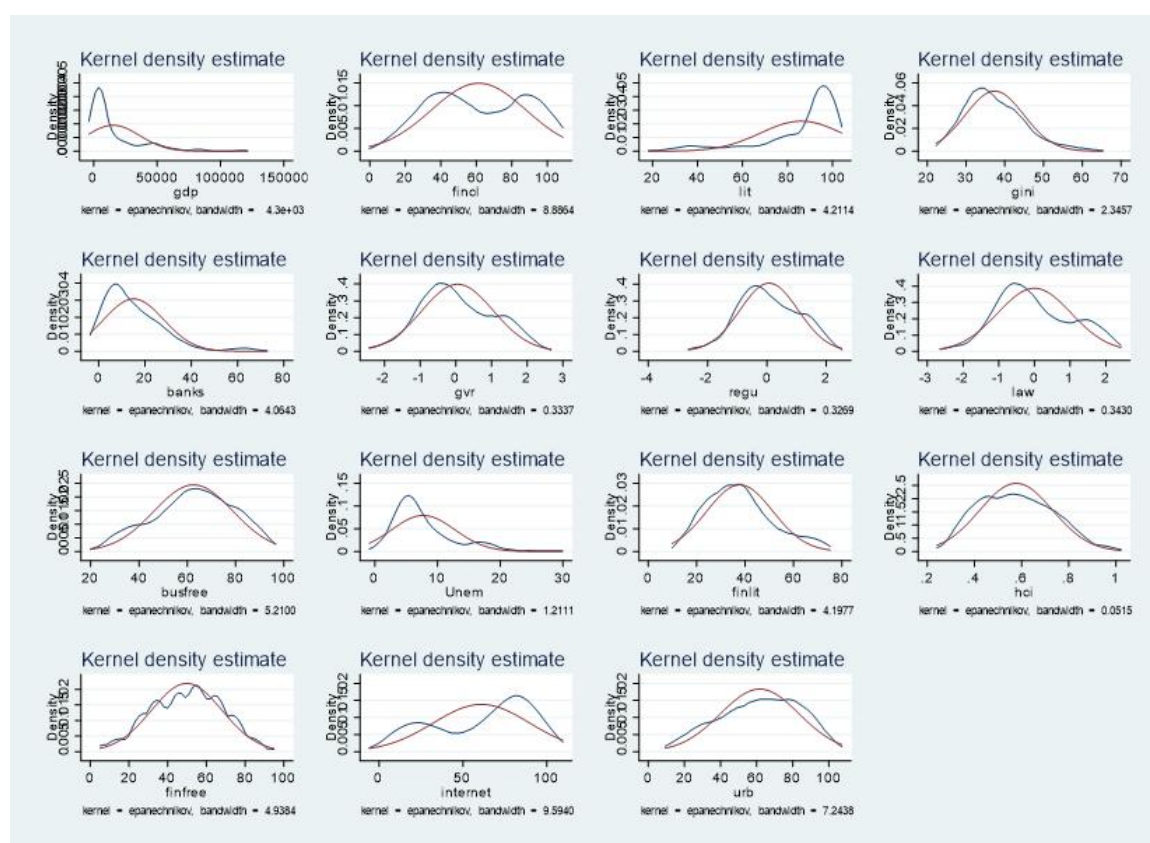
As it can be seen, some densities do not resemble the normal density. Therefore, a natural logarithm was implemented on some variables.

Graph 2: Kernel Density Estimation without Normal Distribution

Looking at the transformed densities, the logarithms of GDP, percentage of unemployment and GINI - inequality variables resemble the normal distribution.
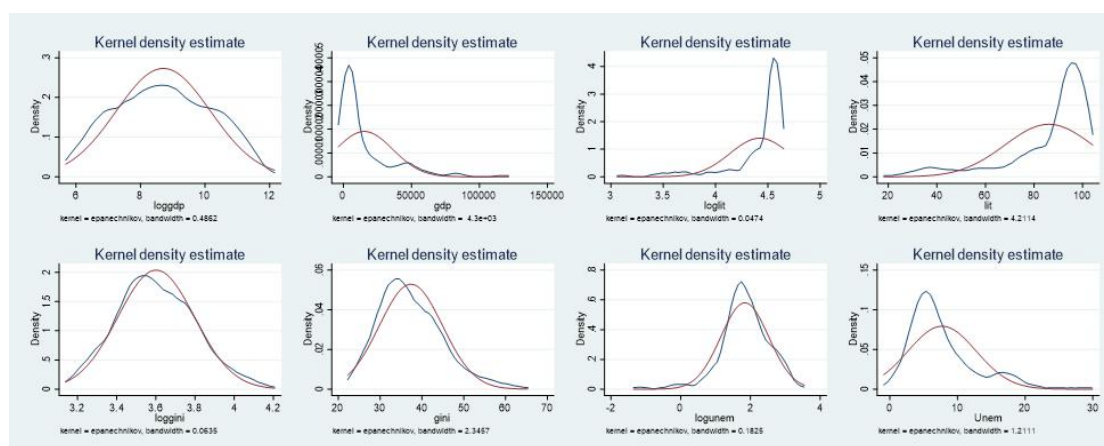
The descriptive statistics below shows as below shows the mean standard deviation and the minimum and maximum value:

Table 2: The Descriptive Statistics

```
. summarize  fincl lit loggdp loggini internet banks gvr regu law hci finlit finfree urb logunem busfree
```

Variable	Obs	Mean	Std. dev.	Min	Max
fincl	144	61.3826	26.67822	8.570004	99.91737
lit	144	86.08695	18.08263	22.31155	99.99995
loggdp	144	8.707231	1.459774	6.165321	11.67162
loggini	144	3.601628	.1956518	3.202746	4.143135
internet	144	60.98034	28.80234	3.671965	100
banks	144	15.13885	12.96448	.41	68.81
gvr	144	.0498057	1.001684	-2.093571	2.3353
regu	144	.0735592	.9812992	-2.321581	2.205607
law	144	-.0023072	1.029596	-2.299745	2.078883
hci	144	.5769841	.1544601	.2916319	.97
finlit	144	37.79861	13.60254	14	71
finfree	144	49.86111	18.20574	10	90
urb	144	61.72028	21.74678	16.626	100
logunem	144	1.838106	.6874221	-1.171183	3.35829
busfree	144	62.59167	16.33034	25	91.4

3.2.2 Creating a dummy variable

In our data, countries are divided by their income into 4 groups which are High income, Upper middle income, Lower middle income, Low income. Dummies variables are created for each income group.
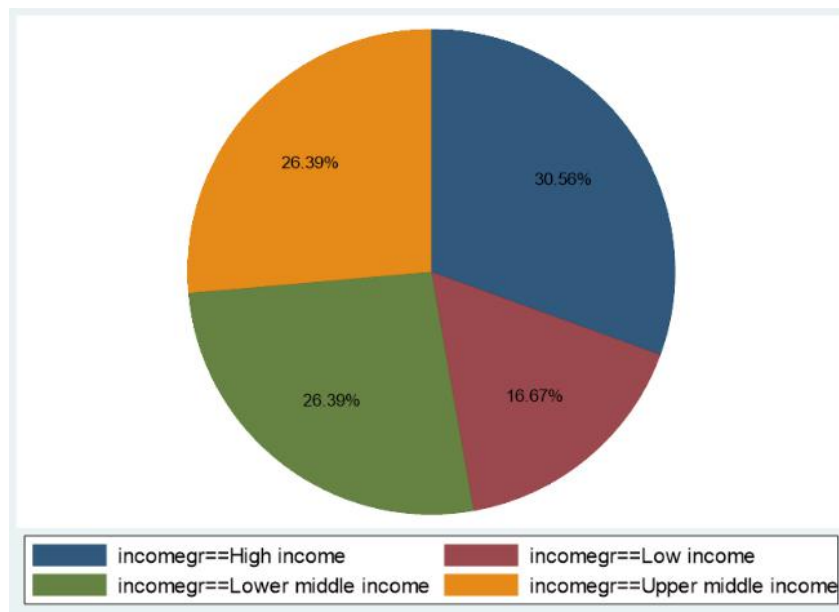
Chart 1: Countries divided by income

We can see that business freedom, financial freedom, financial inclusion and availability of bank branches vary between different income groups. More specifically, the lower the income of the country, the lower the average value of these variables.
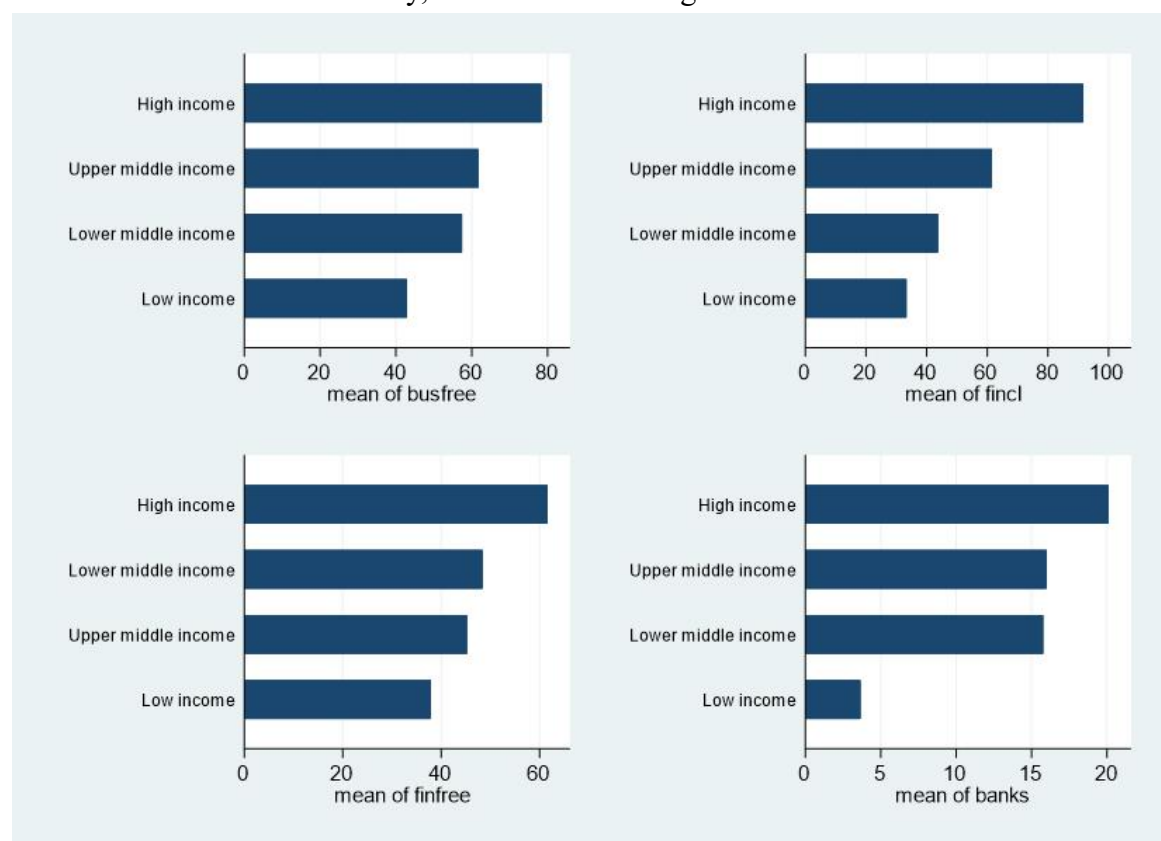
Chart 2: Mean of variables divided by income

3.2.3 First Estimation

Given a large number of explanatory variables and only 144 countries' representatives, we will run a multilinear regression. Before doing so, first let's see the simple linear regression between our dependent variable and the explanatory variables. Let us note, that we observe the relations between financial inclusion and chosen variables, but none of them provide the good fit within the simple linear regression.

Graph 3: Scatter Plot
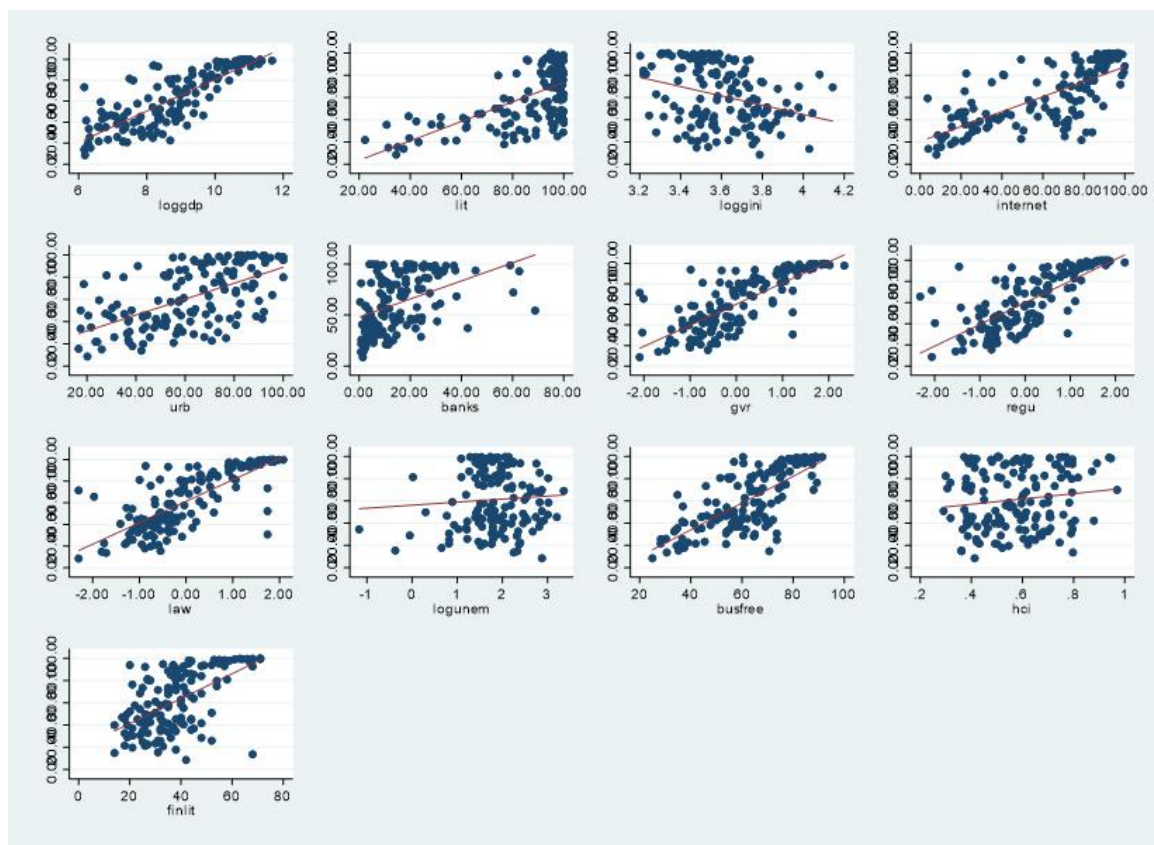
For this reason, we combine the chosen variables into a multiple regression. The results of multilinear regression are shown below:

Table 3: Most Likely Linear Regression

```
.  reg fincl lit loggdp loggini internet banks gvr regu law hci finlit finfree urb logunem busfree income2 income3 income4
>
```

Source	SS	df	MS
Model	83620.5881	17	4918.85812
Residual	18156.4336	126	144.098679
Total	101777.022	143	711.727424

Number of obs	=	144
F(17, 126)	=	34.14
Prob > F	=	0.0000
R-squared	=	0.8216
Adj R-squared	=	0.7975
Root MSE	=	12.004

fincl	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
lit	.2597784	.1070438	2.43	0.017	.0479419	.4716148
loggdp	2.802215	2.400758	1.17	0.245	-1.948814	7.553245
loggini	4.762171	6.367097	0.75	0.456	-7.838126	17.36247
internet	-.1126727	.0887499	-1.27	0.207	-.2883062	.0629608
banks	.3412949	.0934325	3.65	0.000	.1563947	.526195
gvr	.6580054	4.405571	0.15	0.882	-8.060489	9.3765
regu	-.138512	4.596088	-0.03	0.976	-9.234035	8.957011
law	6.457135	3.811387	1.69	0.093	-1.085488	13.99976
hci	-.6045128	6.962327	-0.09	0.931	-14.38275	13.17273
finlit	.3575886	.1072381	3.33	0.001	.1453675	.5698097
finfree	-.2363076	.0805941	-2.93	0.004	-.3958009	-.0768143
urb	-.1354701	.0822415	-1.65	0.102	-.2982237	.0272835
logunem	-.9183656	1.696003	-0.54	0.589	-4.274706	2.437975
busfree	.3372061	.1240798	2.72	0.008	.0916559	.5827564
income2	-9.878018	4.477769	-2.21	0.029	-18.73939	-1.016646
income3	-23.08801	6.014741	-3.84	0.000	-34.99101	-11.18502
income4	-20.07893	8.937353	-2.25	0.026	-37.76568	-2.392167
_cons	-1.231835	32.92994	-0.04	0.970	-66.39922	63.93555

As it can be seen, a lot of variables are not significant as their p-value is greater than 5% level of significance.

3.2.4 Checking for outliers

To control the dataset for outliers, we will try to detect the, using the residuals and leverage the plot.

Graph 4: Plotted Residuals and Density of Residuals
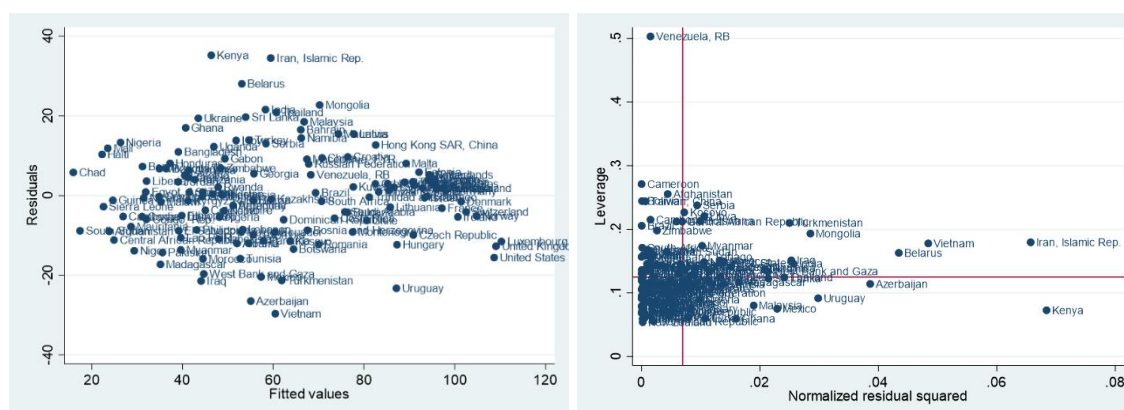
In the graphs, we can see clearly that Kenya and Iran have the highest residuals and Venezuela has the highest leverage, which tends to bring the regression line close to it.

Therefore, Venezuela will be dropped as it has a value greater than (2k+2)/n, k being the number of variables and n is the number of observations.

To test if the residuals follow a normal distribution, we are going to run a skewness

and kurtosis test. The result shows that asymptotically the density of our residuals is normal.

Table 4: Skewness and Kurtosis test for normality

```
Skewness and kurtosis tests for normality
                                                    ——— Joint test ———
    Variable  |    Obs   Pr(skewness)   Pr(kurtosis)   Adj chi2(2)   Prob>chi2
  residfincl |    144        0.1576         0.1183          4.52        0.1045
```

For dealing with the outliers, I will use the plot of the standardized outliers and delete observation that have a higher value than 3 (the 68–95–99.7 rule, values lie within one, two, and three standard deviations).

Graph 5: Kernel Density Estimation
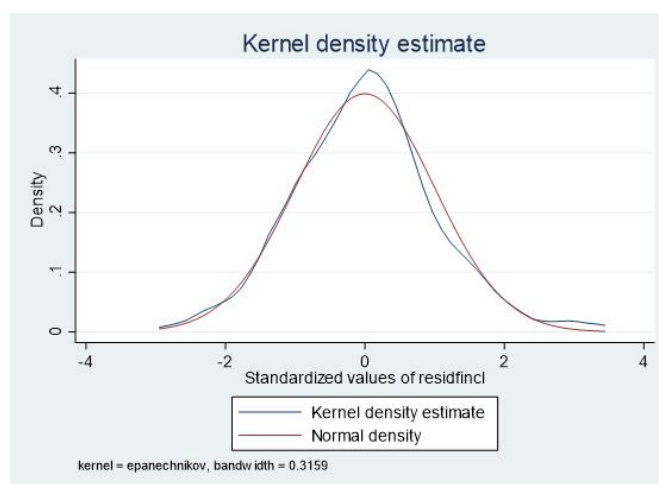
3.2.5 Omitting variables

Running the regression without outliers, we have the following results:

Table 5: Regression without the outliers

```
. reg fincl lit loggdp loggini internet banks gvr regu law hci finlit finfree urb logunem busfree income2 income3 income4
>
```

Source	SS	df	MS
Model	84823.8147	17	4989.63616
Residual	15306.4916	123	124.443021
Total	100130.306	140	715.216474

Number of obs	= 141
F(17, 123)	= 40.10
Prob > F	= 0.0000
R-squared	= 0.8471
Adj R-squared	= 0.8260
Root MSE	= 11.155

fincl	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
lit	.2990816	.100042	2.99	0.003	.1010546	.4971086
loggdp	5.631923	2.789804	2.02	0.046	.1096782	11.15417
loggini	1.979994	5.952995	0.33	0.740	-9.803595	13.76358
internet	-.1400036	.0840685	-1.67	0.098	-.306412	.0264047
banks	.2918126	.0892021	3.27	0.001	.1152425	.4683827
gvr	.5277132	4.094748	0.13	0.898	-7.57759	8.633017
regu	2.280436	4.364196	0.52	0.602	-6.358222	10.91909
law	4.08552	3.692399	1.11	0.271	-3.223358	11.3944
hci	.0331947	6.529735	0.01	0.996	-12.89202	12.95841
finlit	.3416664	.1000041	3.42	0.001	.1437145	.5396183
finfree	-.1949136	.0763261	-2.55	0.012	-.3459963	-.0438308
urb	-.1558446	.0812694	-1.92	0.057	-.3167125	.0050232
logunem	-.2022226	1.587294	-0.13	0.899	-3.344174	2.939729
busfree	.2882207	.1166896	2.47	0.015	.0572408	.5192007
income2	-8.41627	4.195491	-2.01	0.047	-16.72099	-.1115522
income3	-19.00617	6.011487	-3.16	0.002	-30.90554	-7.106801
income4	-11.68064	8.99726	-1.30	0.197	-29.49017	6.128882
_cons	-19.35191	34.10126	-0.57	0.571	-86.85327	48.14944

As it can be observed, a lot of variables are not significant. To check for the multicollinearity problems, we are going to use the Variance Inflation Factor.

Table 6: VIF

```
. vif
```

Variable	VIF	1/VIF
regu	20.56	0.048642
gvr	18.98	0.052688
loggdp	18.54	0.053946
law	16.16	0.061885
income4	12.95	0.077192
income3	7.93	0.126180
internet	6.62	0.151010
busfree	4.14	0.241738
income2	3.79	0.263713
lit	3.75	0.266734
urb	3.48	0.287286
finlit	2.09	0.479105
finfree	2.07	0.483564
loggini	1.54	0.650000
banks	1.51	0.660761
logunem	1.35	0.741978
hci	1.15	0.868533
Mean VIF	7.45	

Variables such as law, gvr, loggdp, regu, internet with a VIF value greater than 5 indicates potentially severe correlation between them and other explanatory variables in the model. Since the gvr, regu, law variables tell us the properties of a country there is high speculation of correlation between these variables. This can be proved by the Pearson correlation values which are close to 1.

Table 7: Correlation Coefficient

```
. correlate regu gvr law loggdp internet
(obs=141)

             |    regu      gvr      law   loggdp internet
-------------+---------------------------------------------
        regu |  1.0000
         gvr |  0.9566   1.0000
         law |  0.9484   0.9547   1.0000
      loggdp |  0.7897   0.7964   0.7759   1.0000
    internet |  0.7479   0.7368   0.7076   0.8771   1.0000
```

Given that some variables have p-value greater than 5% and high VIF, we will test if they are significant of our model using the Fisher test as below. Regarding the Government indexes, we will use law index.

Table 8: Fisher test

```
.  test loggdp loggini internet gvr regu hci logunem urb

 ( 1)  loggdp = 0
 ( 2)  loggini = 0
 ( 3)  internet = 0
 ( 4)  gvr = 0
 ( 5)  regu = 0
 ( 6)  hci = 0
 ( 7)  logunem = 0
 ( 8)  urb = 0

       F(  8,   123) =    1.20
            Prob > F =    0.3047
```

Fisher test p-value is 0.30, we fail to reject the null hypothesis with a level of significance 5%, therefore the coefficients of these variables are 0. We can omit them from our model.

3.2.6 Checking for heteroscedasticity

Given our data without the outliers and normal error terms, Breusch-Pagan test for heteroscedasticity concludes on constant variances with 5 % level of significance.

Graph 4: Breusch-Pagan test

```
.  estat hettest

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of fincl

H0: Constant variance

     chi2(1) =   2.07
Prob > chi2 = 0.1504
```

Moreover, using the White test, we fail to reject the null hypothesis (homoscedasticity) with a level of significance 5%. Hence, our variances are homoscedastic (the true ones). If not the case, we would simply run a robust regression to

correct for the true variances.

Graph 6: White test

```
. whitetst

White's general test statistic :  63.97938  Chi-sq(48)  P-value =  .0612
```

We also assume that we can achieve better fit by dealing with possible endogeneity. For this purpose, we can use instrumental variables and a two-stage least-squares method. Our suggestions for the instrumental variables are, for example, literacy level and financial freedom for financial literacy.

3.2.7 Final Model

Running the regression without the outliers and omitted variables, the model's specification is the following:

$$FINCL_i = \beta_0 + \beta_1 LIT_i + \beta_2 Banks_i + \beta_3 LAW_i + \beta_4 Finlit_i + \beta_5 Finfree_i + \beta_6 Busfree_i + \beta_7 Income2_i + \beta_8 Income3_i + \beta_9 Income4_i + \varepsilon_i$$

(3-1)

The coefficients are summarized below.

Table 9: Final Model

```
. reg fincl lit banks law finlit finfree busfree income2 income3 income4
```

Source	SS	df	MS			
Model	83629.5753	9	9292.17504			
Residual	16500.731	131	125.959779			
Total	100130.306	140	715.216474			

Number of obs	=	141
F(9, 131)	=	73.77
Prob > F	=	0.0000
R-squared	=	0.8352
Adj R-squared	=	0.8239
Root MSE	=	11.223

fincl	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
lit	.2931262	.0966231	3.03	0.003	.1019826	.4842698
banks	.2975733	.0844661	3.52	0.001	.1304791	.4646674
law	6.803294	1.769999	3.84	0.000	3.301813	10.30478
finlit	.3565991	.0959002	3.72	0.000	.1668856	.5463125
finfree	-.1713908	.0692373	-2.48	0.015	-.3083587	-.034423
busfree	.2874368	.1080152	2.66	0.009	.073757	.5011166
income2	-11.00359	3.640132	-3.02	0.003	-18.20464	-3.80254
income3	-22.61285	3.976218	-5.69	0.000	-30.47876	-14.74695
income4	-15.20296	5.795453	-2.62	0.010	-26.66775	-3.738172
_cons	19.61648	12.36108	1.59	0.115	-4.836694	44.06965

The global fisher test p-value is less than 5 % (Prob > F = 0.0000) which means our model is globally significant. The R-square is 0.83 which means 83 percent of the variance is explained by our model.

3.2.8 Another alternative

Given the large number of variables in our model that could explain the financial inclusion and the small number of countries we are going to run a stepwise regression to eliminate all the variables necessary. The stepwise regression is a good choice as it also deals with multicollinearity. A threshold of 5% has been chosen and the method of backward selection, variables with p-value greater than 5% are omitted from the model. The logic of the stepwise regression is fitting the full model on all explanatory variables, while the least-significant term is "insignificant", remove it and re-estimate. The included variables are literacy, financial literacy, government law indexes, business freedom, financial freedom, number of banks per 1000 people and the income groups.

Graph 7: Stepwise

```
. stepwise, pr(.05): regress  fincl lit loggdp loggini internet banks gvr regu law hci finlit finfree urb logunem busfree
> (i.income)
note: 1b.income omitted because of estimability.

Wald test, begin with full model:
p = 0.9760 >= 0.0500, removing regu
p = 0.9299 >= 0.0500, removing hci
p = 0.8682 >= 0.0500, removing gvr
p = 0.5359 >= 0.0500, removing logunem
p = 0.4805 >= 0.0500, removing loggini
p = 0.2176 >= 0.0500, removing loggdp
p = 0.1682 >= 0.0500, removing internet
p = 0.0578 >= 0.0500, removing urb
```

Table 10: Stepwise Linear Regression

Source	SS	df	MS			
				Number of obs	=	144
				F(9, 134)	=	63.68
Model	82490.9243	9	9165.65825	Prob > F	=	0.0000
Residual	19286.0973	134	143.926099	R-squared	=	0.8105
				Adj R-squared	=	0.7978
Total	101777.022	143	711.727424	Root MSE	=	11.997

fincl	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
lit	.2544492	.1025726	2.48	0.014	.0515785	.4573199
finlit	.364059	.1017216	3.58	0.000	.1628713	.5652467
finfree	-.2073911	.0711303	-2.92	0.004	-.3480745	-.0667077
busfree	.3159021	.1124679	2.81	0.006	.0934602	.538344
banks	.3080689	.0890939	3.46	0.001	.1318568	.484281
law	6.530727	1.734103	3.77	0.000	3.100974	9.96048
income						
2	-10.5172	3.828991	-2.75	0.007	-18.09028	-2.944124
3	-22.00694	4.215802	-5.22	0.000	-30.34506	-13.66881
4	-16.92623	6.171113	-2.74	0.007	-29.13162	-4.720843
_cons	23.03989	12.87881	1.79	0.076	-2.432161	48.51193

Our model is globally significant and the R-square decreased with only 3% which is not a large difference from our model excluding the outliers.

Testing again for heteroskedasticity, the White test and Breusch-Pagan test (our residuals asymptotically follow a normal) conclude on the same results as the corresponding p-values are greater than 5%., Hence, our model is homoscedastic.

Table 11: Skewness and Kurtosis test for normality

```
Skewness and kurtosis tests for normality
                                                   —— Joint test ——
    Variable |     Obs   Pr(skewness)   Pr(kurtosis)   Adj chi2(2)   Prob>chi2
-------------+------------------------------------------------------------------
         res |     144      0.1301          0.0526          5.85        0.0538

.  estat hettest

Breusch–Pagan/Cook–Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of fincl

H0: Constant variance

    chi2(1) =    3.04
Prob > chi2 = 0.0812

. whitetst

White's general test statistic :   51.3713  Chi-sq(48)  P-value =  .3431
```

This alternative model confirms our previous results, but it does not offer new insights, so the following discussion and recommendations will be based on the model (3-1).

4. Results and Discussion

The final model's specification is the following:

$$FINCL_i = 23.04 + 0.25LIT_i + 0.3Banks_i + 6.53LAW_i + 0.36Finlit_i - 0.2Finfree_i + 0.32Busfree_i - 10.52Income2_i - 22Income3_i - 26.93Income4_i + \varepsilon_i$$

The measurement results above show that the literacy rate passes the test at the 5% level of significance, indicating that literacy rate has a significant effect on financial inclusion in economies with different levels of income. The positive regression coefficient demonstrates a positive effect. In terms of the degree of influence of each index on the financial inclusion system in 2020, each unit increase in literacy rate will contribute to a significant increase of 0.25 units in the financial inclusion index, when holding other factors constant. The literacy rate to some extent represents the level of education and the result virtually indicates that the financial inclusion level is higher in regions with a higher literacy rate.

Similarly, it can be concluded that since commercial bank branches per 100,000 adults, agents' confidence in law, financial literacy and business freedom all pass the test at 5% level of significance and get positive regression coefficients, stating that all the above four variables have a positive effect on The regression coefficients are positive, indicating that the above four variables have a significant positive effect on financial inclusion, with each unit increase in the bank branches index contributing to a significant increase of 0.3 units in the financial inclusion index, each unit increase in the financial literacy index contributing to a significant increase of 0.36 units in the financial inclusion index, and each unit increase in the financial literacy index contributing to a significant increase of 0.36 units in the financial inclusion index. The financial inclusion index will increase by 0.32 units for every 1 unit increase in the business freedom index.

We can explain in that way that the more commercial bank branches per 100,000 adults, the higher the demand for participation in financial activities and the more active the economy is in providing a platform for financial activities; countries, where agents have higher confidence in the law, are also inclined to have higher financial inclusion because a robust and reliable legal system and law enforcement system are important institutional cornerstones for advancing financial inclusion policy. Financial literacy is crucial to explain financial inclusion: the higher a country's knowledge of the financial system, behavioral propensity to engage in financial flows, and attitudes toward the financial industry, the higher its financial inclusion; the higher the business freedom index, the more the economy is The higher the business freedom index, the more the economy conforms to the free economic market and welcomes and encourages free trade and investment transactions of financial capital, the more it can promote local financial

activity and the degree of financial inclusion gains.

In our study, we use dummy variables to distinguish between income groups, using higher income groups as the baseline category. The negative coefficient estimates corresponding to the dummy variables representing income groups confirm that countries with lower incomes have lower values of financial inclusion.

Financial freedom passes the test at the 5% significance level, but it has a negative coefficient, with each unit increase in the financial freedom index contributing to a significant decrease of 0.2 units in the financial inclusion index, showing that financial freedom has a significant negative effect on financial inclusion in economies with different levels of income, contrary to our common knowledge. However, when considering that since the indicator is scored by five dimensions, some of which relate to the role of the government in regulating the mechanism of uneven distribution of financial resources, as well as efforts in the stability of the financial and monetary system, a high degree of financial freedom openness may have a negative effect, especially in countries with poor financial systems and initial financial foundations.

5. Conclusion

Financial inclusion refers to the process of promoting affordable, timely, and adequate access to regulated financial products and services and broadening their use by all segments of society through the implementation of tailored existing and innovative approaches, with a view to promoting financial well-being as well as economic and social inclusion.

Financial services can help people to avoid poverty by making investments in their health, education, and businesses. They make it easier to tackle financial emergencies that seriously reduce one's financial well-being, for example, a job loss or unexpected expenses. That's why the central banks all over the world have made it a key priority to promote financial inclusion — access to and use of formal financial services by individuals and firms. This study confirms that Income as measured by per capita GDP, income inequality, adult literacy are important determinants of inclusion, while factors like urbanization rate, financial literacy, financial freedom, availability of bank branches and internet penetration can also enhance financial inclusion. The model developed in the study shows that 83% of variation of a financial inclusion variable is explained by literacy rate, number of commercial bank branches per 100,000 adults, rule of law index, financial literacy, financial and business freedom indexes, and the income of the country.

Within the developing world, studies show factors such as urban population as a percentage of the total population and financial freedom level as significant predictor variables to banking a population. In this analysis, this was not found to be accurate. While the literacy rate, number of bank branches, rule of law index, financial literacy, business freedom indexes, and the income of the country have positive effects on the financial inclusion, since they are included in the model with positive coefficients, financial freedom enters the model with a negative coefficient. This does not necessarily indicate that the degree of financial inclusion decreases when the percentage of urban population and the degree of openness of financial freedom are too high. In the multiple regression, it is possible that for effect of the intercorrelations between the independent variables of the partial regression, coefficient of an independent variable may be negative in the face of a positive correlation coefficient between this variable and the dependent variable. Hence, we cannot reject the idea that higher level of financial freedom increases financial inclusion. This issue offers the perspectives for further research.

References

[1] Rangarajan Committee, Report of the Committee on Financial Inclusion, Government of India, 2008.

[2] Amidic, G., Massara, A. and Mialou, A., Assessing countries' financial inclusion standing: A new composite index, 2014.

[3] Camara, N. and Tuesta, D., Measuring financial inclusion: A multimensional index. BBVA Research Paper, 2014.

[4] Adeola, O. and Evans, O., Financial inclusion, financial development, and economic diversification in Nigeria. The Journal of Developing Areas, 2017(3).

[5] Swamy, V., Bank - based financial intermediation for financial inclusion and inclusive growth. Available at SSRN 2126834, 2012.

[6] Babajide, A. A., Adegboye, F. B. and Omankhanlen, A. E., Financial inclusion and economic growth in Nigeria. International Journal of Economics and Financial Issues, 2015(3).

[7] Park, C. Y. and Mercado, R., Financial inclusion, poverty, and income inequality in developing Asia. Asian Development Bank Economics Working Paper Series, 2015.

[8] Neaime, S. and Gaysset, I., Financial inclusion and stability in MENA: Evidence from poverty and inequality. Finance Research Letters, 2018(24).

[9] Uddin, A., Chowdhury, M. A. F. and Islam, M. N., Determinants of Financial Inclusion in Bangladesh: Dynamic Gmm & Quantile Regression Approach. The Journal of Developing Areas, 2017(2).

[10] Karpowicz, M. I., Financial inclusion, growth and inequality: a model application to Colombia (No. 14 - 166). International Monetary Fund, 2014.