The Efficiency of Financial Inclusion: Evidence from the Global Findex Database

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Abstract.

Financial inclusion is one of the main policy tools to increase welfare, reduce poverty and enhance macroeconomic stability which creates different opportunities and challenges for both developing and developed countries. More than two billion people in the world that are not financially included, and the World Bank has committed to helping them gain access to financial services by 2020. This has made it necessary for policy makers to be prepared for these regulations. Thus, the purpose of this paper is estimate efficiency of financial inclusions for countries around the world by using non-parametric techniques. The results show that there are 9 countries efficient for maximizing their financial inclusion; while 128 countries are inefficient. Moreover, the paper calculates relative efficiency scores and potential recovery rates of countries in order to help policymakers about how to change macro-economic variables so that financial inclusion becomes efficient.

Keywords: financial exclusion, macroeconomic stability, non-parametric techniques, efficiency, potential recovery rate

1. Introduction

According to World Bank, "*financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way"*. In the world, nearly – 1.7 billion – are still unbanked, according to the latest Findex data and The World Bank is committed to helping people financially included. The reason behind this, there are many empirical studies show that financial inclusion is one of the important policy tools to increase welfare, reduce poverty, enhance macroeconomic stability and increase tax revenue (Beck et al., 2007; Sarma and Pais, 2011; Andrianaivo and Kpodar, 2011; Cull et al., 2012; Kim, 2016; Oz-Yalaman, 2019).

In the literature, there are many papers about the determinants of financial inclusion. For example, Allen et. al. (2012) find that the probability of owning an account at a formal financial institution is higher for richer, more educated, older, urban, employed, married or separated individuals. Similarly, Fungacova and Weill (2015) indicate that richer, more educated, older men in China are more likely to be financially included. For African countries, Zins and Weill (2016) also stress that older people, higher income, higher education and being a man associated with higher financial inclusion. In addition to demographic variables, there are other determinants that affect financial inclusion. For example, Allen et. al. (2012) indicate that higher institutional quality and political stability bring higher financial inclusion. Kumar (2013) shows that branch density and level of industrialization have a strong positive effect on financial inclusion. Akudugu (2013) indicates that trust in formal markets is another important determinant of financial inclusion. He shows that people who have trust in the financial markets are more likely to be financially included. Laha and Kuri (2011) show that there is negative relationship between dependency ratio and financial inclusion. Also, Kuri and Laha (2011) indicate that there is positive correlation between the level of human development and financial inclusion. Hajilee et. al. (2017) indicate that the existence of shadow economy negatively and significantly affects financial market inclusion in the long run. Sarma and Pais (2011) find that there is negative and significant relationship between Gini coefficient and financial inclusion. They also indicate that rural population is negatively associated with financial inclusion. Moreover, their results show that interest rate has negative relationship but it does not show any significant relationship with financial inclusion.

It is necessary for policy makers to ensure optimal financial inclusion if we take into account the effect of financial inclusion on poverty, welfare, macroeconomic stability and tax revenue. Thus, it makes important to estimate the efficiency of financial inclusion for policy makers. Interestingly, there is no any paper on efficiency of financial inclusion for countries. To fill this gap in the literature, this paper is to estimate efficiency of financial inclusions for countries around the world by using non-parametric techniques as data envelopment analysis.

2. Methodology, Data and Empirical Results

To help policy makers how to change variables in order to become efficient financial inclusion, the paper uses Data envelopment analysis (DEA). Data envelopment analysis

(DEA) is a linear programming based technique for measuring the relative performance of units where the presence of multiple inputs and outputs makes comparison difficult (Boussofiane et. al., 1991). For this, the paper uses CCR model to maximization of output.

This is the most wide used and best known DEA model which used constant returns to scale (Charnes et. al., 1978). The data covers 137 countries for the year 2017, for which the data is available. The datas are obtained from World Bank Database, only shadow economy data is obtained from Elgin and Oztunali (2012). Output and input variables are stated below:

Output:

- Financial inclusion

Inputs:

- Shadow economy
- Rural population
- Age dependency
- Gini coefficient
- Corruption
- Interest rate

By using Data Envelopment Analysis, the paper calculates efficiency scores and potential recovery rates of 137 countries for the year 2017. The potential recovery rate is calculated as follow:

$$X_2 = (X_1) - [(X_1)*(1- \alpha)] \quad (1)$$

Where X_2 is the amount of input required (target input), and X_1 is the amount of actual input used, α is efficiency score. Therefore, the potential recovery rate is:

$$(\theta) = (X_2 - X_1) / X_1 \quad (2)$$

The calculated potential recovery rates demonstrate the level of needed increases output or decreases input to make corresponding country efficient. The efficiency scores are close to **100** that indicates relatively higher financial inclusion efficiency performance on than the others. Table 1 presents the efficient countries. According to Table 1, there are 9 countries which are efficient for maximizing their financial inclusion.

Table 1: Efficient Countries

Unit Name	Score
Denmark	100

Canada	100
Singapore	100
Netherlands	100
Luxembourg	100
Belgium	100
United Arab Emirates	100
Japan	100
Switzerland	100

Table 2 presents average potential improvement rates. According to the Table 2, inefficient countries should decrease their shadow economy (20.05%), rural population (22.22%), age dependency (14.55%), income inequality (16.32%), corruption (13.39%) and interest rate (13.47%), respectively.

Table 2: Average Potential Improvement Rates

Variable	Average Potential Improvements
Shadow Economy	- 20,05%
Rural Population	- 22,22 %
Age Dependency	- 14,55 %
Gini Coefficient	- 16,32 %
Corruption	- 13,39 %
Interest Rate	- 13,47 %

The paper also calculates potential recovery rates for inefficient countries, which helps policy makers how to change some determinants in order to become efficient financial inclusion. Table 3 presents potential recovery rates for inefficient countries. It can be seen from the Table 3, there are 128 countries which is inefficient.

Table 3: Potential Recovery Rates

	Score	se	rural	dep	Gini	corr	ir
Norway	99,93	-11,8	-15,2	-0,1	-0,1	-0,1	-0,1
Australia	99,89	-0,1	-19,6	-0,1	-0,1	-0,1	-0,3
Finland	99,88	-0,1	-17,2	-6	-0,1	-0,1	-0,1
Sweden	99,83	-6,4	-4,9	-5,7	-0,2	-0,2	-0,2
New Zealand	99,77	-0,2	-33,4	-5,9	-0,2	-0,2	-0,4
Austria	99,38	-0,6	-78,1	-12,1	-0,7	-0,6	-0,7
Germany	99,36	-0,6	-38,8	-0,6	-0,7	-0,6	-0,7
Malta	98,38	-40,8	-1,6	-1,6	-1,7	-1,6	-1,7
Estonia	98,22	-43,3	-58	-1,8	-1,9	-1,8	-1,9
Slovenia	97,88	-38,7	-64,9	-2,1	-2,2	-2,1	-2,2
US	97	-3	-3	-3	-5,3	-5,3	-5,3
UK	96,88	-3,1	-48,4	-9,2	-3,1	-3,1	-3,1
Ireland	95,66	-4,3	-69,7	-4,3	-4,4	-4,3	-4,4
Iran	95,01	-22,9	-49,2	-5	-5,3	-5	-5,2

France	94,35	-5,6	-50,1	-14,1	-5,7	-5,6	-5,7
Spain	94,16	-31,7	-21,9	-5,8	-6	-5,8	-6
Italy	94,12	-41,8	-60,7	-5,9	-6,1	-5,9	-6,3
Latvia	93,55	-42,5	-60,2	-6,4	-6,6	-6,4	-6,6
Israel	93,48	-35,4	-6,5	-22,7	-6,6	-6,5	-6,9
Mongolia	93,46	-11	-51,9	-6,5	-6,8	-6,5	-7,5
Portugal	92,66	-34,3	-63,4	-7,3	-7,5	-7,3	-7,5
Mauritius	90,95	-41,2	-82	-9	-9,2	-9	-9,8
Cyprus	89,61	-51,7	-63,3	-10,4	-10,5	-10,4	-10,4
Poland	87,36	-49,5	-63,3	-12,6	-12,7	-12,6	-12,7
Croatia	86,59	-53,3	-69,3	-13,4	-13,6	-13,4	-13,6
Malaysia	86,21	-57,5	-48,6	-13,8	-14	-13,8	-14
Greece	85,9	-46	-46,8	-14,1	-14,3	-14,1	-14,3
Bahrain	85,4	-36,3	-91,2	-14,6	-14,8	-14,6	-14,6
Slovakia	85,1	-28,1	-74,4	-14,9	-15,1	-14,9	-15
Lithuania	83,34	-54,7	-58,5	-16,7	-16,8	-16,7	-16,8
Thailand	82,82	-76,3	-82,5	-17,2	-98,9	-17,2	-17,5
China	82,7	-17,3	-86,2	-17,3	-18,4	-18,2	-18,4
Kuwait	82,58	-41,8	-17,4	-22,8	-18,3	-18,1	-17,4
Kenya	82,07	-51,5	-86,4	-37,6	-18,2	-17,9	-18,4
Belarus	81,97	-70,1	-41,2	-18	-98,4	-18	-18,2
T&T	81,67	-65,8	-74	-18,3	-18,5	-18,3	-18,7
Czech R.	81,45	-24,7	-51,9	-18,6	-18,7	-18,6	-18,8
Namibia	81,04	-46	-80,6	-32,9	-19,1	-19	-19,1
India	80,44	-33,4	-79,2	-19,6	-19,7	-19,6	-20,2
Russia	76,54	-72,2	-49,4	-23,5	-23,7	-23,5	-24
Hungary	75,57	-53,1	-52,8	-24,4	-24,6	-24,5	-24,4
Chile	75,2	-40,8	-24,8	-24,8	-99,2	-24,8	-24,8
Sri Lanka	74,22	-70,3	-86,2	-25,8	-26	-25,8	-26,2
Venezuela	74,19	-66,5	-25,8	-25,8	-26,1	-25,8	-26,1

Table 3: Potential Recovery Rates

	Score	se	rural	dep	Gini	corr	ir
S. Arabia	72,89	-38,8	-55,1	-27,1	-27,2	-27,1	-27,1
Bulgaria	72,74	-60,5	-59,9	-27,3	-27,4	-27,3	-27,6
Brazil	71,04	-71,5	-29	-29	-99,3	-29	-31,9
South Africa	69,79	-56,1	-68,3	-30,2	-30,4	-30,2	-30,7
Turkey	69,22	-62,8	-52,1	-30,8	-30,9	-30,8	-30,9
Costa Rica	68,7	-57,6	-52,8	-31,3	-99,3	-31,3	-31,9
Uruguay	64,87	-74,4	-35,1	-35,3	-99,2	-35,1	-35,7
Ukraine	63,87	-81	-65,1	-36,1	-36,5	-36,3	-36,1
Georgia	61,81	-84,3	-76,5	-38,2	-99,2	-38,2	-38,6
Uganda	59,84	-72,1	-90,5	-65,2	-40,3	-40,2	-41,2
Bosnia&Her.	59,81	-73,4	-83,7	-40,2	-40,3	-40,2	-40,4
Kazakhstan	59,36	-74,6	-80,2	-40,6	-98,9	-40,6	-40,8

Gabon	59,29	-80,4	-40,7	-51,4	-99,2	-40,7	-40,9
Romania	58,42	-69,4	-77,9	-41,6	-41,7	-41,6	-41,7
Ghana	58,32	-72	-84	-52,3	-41,8	-41,7	-41,8
Dominican	56,91	-68,9	-59,5	-43,1	-43,3	-43,1	-43,9
Zimbabwe	55,97	-85,4	-89,9	-62,2	-44,2	-44	-44,3
Bolivia	55,06	-85	-78,3	-50,5	-99,4	-44,9	-45,2
Ecuador	51,94	-70,9	-80,4	-48,1	-99,4	-48,1	-48,2
Botswana	51,63	-70,2	-79,8	-53,4	-48,4	-48,4	-48,7
Bangladesh	50,8	-75,5	-86,3	-49,2	-49,3	-49,2	-49,5
Rwanda	50,63	-74,4	-92,5	-62	-49,4	-49,4	-49,9
Indonesia	49,61	-57,3	-79,8	-50,4	-99,4	-50,4	-50,8
Argentina	49,54	-70,2	-50,5	-52,1	-99,4	-50,5	-50,6
Paraguay	49,34	-77,5	-84,1	-50,7	-99,5	-50,7	-51,6
Armenia	48,64	-81,7	-78,6	-51,4	-99,3	-51,4	-52
Tajikistan	47,76	-82,1	-92	-58,6	-52,4	-52,2	-53,5
Tanzania	47,44	-83,8	-91,3	-69,7	-52,7	-52,6	-53,4
Panama	47,21	-85,3	-80	-52,8	-99,5	-52,8	-53,2
Colombia	46,62	-79,3	-60,2	-53,4	-99,5	-53,4	-53,9
Zambia	46,56	-81,8	-90	-70,9	-53,6	-53,4	-53,7
Lesotho	46,24	-72,5	-92,2	-57,1	-53,9	-53,8	-54,2
Nepal	46,1	-77,8	-93	-55,7	-54	-53,9	-54
Honduras	46,06	-83,1	-87,1	-55,5	-99,5	-53,9	-54,7
Togo	46	-77	-90,5	-67,6	-54,1	-54	-54,3
Lebanon	45,64	-81,3	-54,4	-54,4	-54,5	-54,4	-54,7
Moldova	45,1	-86,8	-94,6	-54,9	-99,1	-54,9	-55,1
Guatemala	44,83	-84,5	-88,9	-61,6	-55,3	-55,2	-55,7
Burkina F.	43,86	-79,2	-92,5	-72,7	-56,2	-56,1	-56,3
Algeria	43,51	-76,1	-80,2	-56,5	-56,6	-56,5	-56,8
Peru	43,36	-86,3	-69,1	-56,6	-99,5	-56,6	-56,7
Jordan	43,28	-66,3	-56,7	-62,7	-56,8	-56,7	-57,1
Senegal	43,05	-82,3	-90,1	-71,8	-57	-57	-57,2
Mozambique	42,41	-77	-92	-73,9	-57,7	-57,6	-58,3

Table 3: Potential Recovery Rates

	Score	se	rural	dep	Gini	corr	ir
Coted'Ivoire	42,06	-85,6	-89,7	-71	-58,1	-57,9	-58,3
Kyrgyz R.	40,7	-81,8	-92,2	-60,2	-99,3	-59,3	-59,9
Nigeria	40,43	-85,9	-90,2	-74	-59,7	-59,6	-59,9
Benin	39,24	-86,4	-91	-73,9	-60,9	-60,8	-61,1
Tunisia	37,75	-84,2	-78,9	-62,3	-62,3	-62,3	-62,3
Mexico	37,74	-79,6	-69,6	-62,3	-62,4	-62,3	-62,4
Liberia	36,48	-85,6	-91	-74,5	-63,6	-63,5	-63,6
Mali	36,19	-84,8	-92,4	-79,8	-63,9	-63,8	-64
Ethiopia	35,6	-80,3	-94,5	-75,2	-64,5	-64,4	-64,5
Cameroon	35,39	-81,2	-90,2	-76,2	-64,7	-64,6	-64,7

Philippines	35,27	-84,2	-91,9	-65,2	-64,8	-64,7	-64,9
Malawi	34,5	-86,1	-94,9	-78	-65,6	-65,5	-66,3
Egypt	33,61	-82,5	-92,8	-70,3	-66,5	-66,4	-66,4
Vietnam	31,84	-68,2	-93,9	-68,2	-68,2	-68,2	-68,3
Nicaragua	31,68	-88,1	-90	-68,3	-68,4	-68,3	-68,6
El Salvador	31,16	-88,2	-85,6	-68,8	-99,6	-68,8	-68,9
Lao PDR	29,88	-79,2	-94,4	-71,1	-70,2	-70,1	-70,2
Azerbaijan	29,64	-91,2	-92,2	-70,4	-70,4	-70,4	-70,4
Morocco	29,47	-85,9	-87,8	-70,5	-70,6	-70,5	-70,6
Congo,D.R.	27,01	-88,8	-94,2	-84,5	-73,4	-73,3	-73
Congo, R.	26,94	-90,4	-90,2	-81,1	-73,2	-73,1	-73,2
Guinea	24,34	-88,8	-95,4	-84,6	-75,7	-75,7	-75,7
Chad	22,63	-90,4	-96,4	-87,2	-77,4	-77,4	-77,4
Cambodia	22,55	-91	-96,2	-77,5	-77,5	-77,5	-77,5
Pakistan	22,16	-89,3	-95,7	-81,1	-77,9	-77,8	-78
Mauritania	21,74	-87,1	-94,4	-84	-78,3	-78,3	-78,6
SierraLeone	20,68	-91,2	-95,7	-85,3	-79,4	-79,3	-79,4
Madagascar	18,76	-92	-96,4	-86,5	-81,3	-81,2	-82,2
Niger	16,42	-92,8	-97,6	-91,7	-83,6	-83,6	-83,7
C.African R.	14,66	-95	-97	-90,8	-85,4	-85,3	-85,4
Qatar	1,67	-99,2	-98,3	-98,3	-99	-99	-99
Oman	1,01	-99,3	-99,8	-99	-99	-99	-99
Angola	1	-99,6	-99,7	-99,4	-99	-99	-99
Jamaica	0,99	-99,6	-99,6	-99	-99	-99	-99
Yemen	0,99	-99,4	-99,8	-99,3	-99	-99	-99
Syrian	0,99	-99,1	-99,7	-99	-99	-99	-99
Burundi	0,99	-99,6	-99,9	-99,4	-99	-99	-99
Bhutan	0,99	-99,4	-99,7	-99	-100	-99	-99
Comoros	0,99	-99,6	-99,8	-99,2	-99	-99	-99
Belize	0,99	-99,6	-99,8	-99	-99	-99	-99

3. Conclusion

Financial inclusion is one of the important policy tools for policy makers to increase welfare, reduce poverty, increase tax revenue and enhance macroeconomic stability which creates different opportunities and challenges for countries. Thus, the purpose of this paper is estimate efficiency of financial inclusions for countries around the world by using DEA. The results show that there are 9 countries efficient for maximizing their financial inclusion; while 128 countries are inefficient. Out of 128 countries, there are 38 countries with efficiency scores below %40. The study also calculates potential recovery rate for inefficient countries, which helps policy makers how to change some determinants in order to become efficient financial inclusion.

It is clear that DEA measure relative efficiency score. Thus it is reasonable to measure efficiency score in terms of World Bank country classifications for further studies to get more robust results.

References

Akudugu, M. A. (2013). The determinants of financial inclusion in Western Africa: Insights from Ghana. *Research Journal of Finance and Accounting*, *4*(8), 1-9.

Allen, F., Demirguc-Kunt, A., Klapper, L., & Peria, M. S. M. (2012). *The foundations of financial inclusion: Understanding ownership and use of formal accounts*. The World Bank.

Andrianaivo, M. & Kpodar, K., (2011). *ICT, financial inclusion, and growth evidence from African countries* (No. 11-73). International Monetary Fund.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of economic growth*, *12*(1), 27-49.

Boussofiane, A., Dyson, R. G., & Thanassoulis, E. (1991). Applied data envelopment analysis. *European Journal of Operational Research*, *52*(1), 1-15.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European journal of operational research*, *2*(6), 429-444.

Cull, R., Demirgüç-Kunt, A., & Lyman, T. (2012). Financial inclusion and stability: What does research show?, No.9443. The World Bank.

Elgin, C., & Oztunali, O. (2012). Shadow economies around the world: model based estimates. *Bogazici University Department of Economics Working Papers*, *5*(2012), 1-48.

Fungáčová, Z., & Weill, L. (2015). Understanding financial inclusion in China. *China Economic Review*, *34*, 196-206.

Hajilee, M., Stringer, D. Y., & Metghalchi, M. (2017). Financial market inclusion, shadow economy and economic growth: New evidence from emerging economies. *The Quarterly Review of Economics and Finance*, 66, 149-158.

Kim, J. H. (2016). A study on the effect of financial inclusion on the relationship between income inequality and economic growth. *Emerging Markets Finance and Trade*, *52*(2), 498-512.

Kumar, N. (2013). Financial inclusion and its determinants: evidence from India. *Journal of Financial Economic Policy*, *5*(1), 4-19.

Kuri, P. K., & Laha, A. (2011). Financial inclusion and human development in India: an inter-state analysis. *Indian Journal of Human Development*, 5(1), 61-77.

Laha, A., & Kuri, P. K (2011). Determinants of financial inclusion: A study of some selected districts of West Bengal, India. *Indian journal of finance*, *5*(8), 29-36.

Oz-Yalaman, G. (2019). Financial inclusion and tax revenue. *Central Bank Review*, *19*(3), 107-113.

Sarma, M., & Pais, J. (2011). Financial inclusion and development. *Journal of international development*, *23*(5), 613-628.

The World Bank, The Global Findex Database 2017, https://globalfindex.worldbank.org/#data_sec_focus

The World Bank, World Development Indicators Database, https://databank.worldbank.org/home.aspx

Zins, A., & Weill, L. (2016). The determinants of financial inclusion in Africa. *Review of Development Finance*, *6*(1), 46-57.