Measuring Financial Inclusion: A Multidimensional Index

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Outline

Why should we care about financial inclusion (FI)?

- The World Bank's estimates, for 2011, state that half the adult population in the world did not have a bank account in a formal financial institution

- Financial inclusion, as well as income, health and housing, is a basic ingredient of human well-being. It has a positive effect on economic growth and development

- A person's right to use formal financial services, as a way for preventing social exclusion, must be a priority

- WB's objective of achieving universal financial access by 2020 recognises FI as fundamental to the alleviation of poverty

The challenge of measuring the unobserved

- While the importance of financial inclusion is well-established, there is no formal consensus on how it should be measured

Our goal

- To define a comprehensive measure as a proxy for the inclusiveness of financial systems from a multidimensional perspective

- To construct a harmonized FI index comparable across countries and over time

- To offer a useful tool at different levels of aggregation (dimensions and overall index) to inform policymakers

FI definition

- There is no unique definition for financial inclusion...

- Financial inclusion means that all working age adults have effective access to credit, savings, payments and insurance from formal service providers. Effective access involves convenient and responsible service delivery, at a cost affordable to the customer and sustainable for the provider with the result that financially excluded customers use formal financial services rather than existing informal options (CGAP)

- ...

- Use of formal financial services (Allen et al., 2012; Demirguc-Kunt and Klapper, 2013)

FI definition

- We collate nine definitions of financial inclusion and try to detect common patterns

- Most of the definitions coincide in three key concepts or dimensions of financial inclusion: access, quality and usage

- We define an inclusive financial system as one that maximizes usage and access, while minimizing involuntary financial exclusion (as a proxy of quality). Minimization of perceived barriers is measured by the obstacles for those individuals who do not participate in the formal financial system

- We consider that access and barriers measure the degree of readiness for financial inclusion while usage is considered as the output

- Given the degree of readiness for inclusion, how many people participate in the formal financial system?

Motivation
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Literature
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Data
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Econometric Strategy
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Conclusions
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FI definition
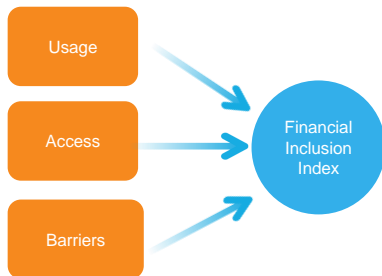
Literature

- Analysis of individual FI-related indicators (Demirguç-Kunt and Klapper, 2013) $+$ demand-side data
- Two commonly used approaches to construct composite indices: non-parametric and parametric methods
  - Non-parametric methods assign the importance of indicators by choosing the weighs exogenously; based on researchers' intuition: Sarma (2008, 2012) and Chakravarty and Pal (2010) $+$ supply-side data
  - Parametric methods (PCA and CFA) the importance of indicators (weights) in the overall index can be determined endogenously: Amidžić *et al.* (2014) measure FI based on a CFA $+$ supply-side data

  From an empirical point of view, PCA is preferred over CFA,because it is not necessary to make assumptions on the raw data

Literature

- To the best of our knowledge, the attempts to measure financial inclusion are scarce and incomplete
    - Country level supply-side data vs. individual level demand-side data for measuring usage (distribution? multiple accounting?)
    - There is no representation of unbanked and potential demand
    - Non-parametric methods vs. parametric
    - There is no indicator for measuring quality
    - Limited evidence regarding number of countries

- Literature lacks a comprehensive indicator that can bring together information on financial inclusion by using a statistically sound weighting methodology and accurate information for a representative number of countries

Our hypothesis

- Our hypothesis is that focusing only on usage and access leads to limited measurement of FI
- Access and usage are necessary but not sufficient conditions for measuring the inclusiveness of a financial system
- We approach FI measurement from a double perspective:
    - From the banked side: by measuring the actual use of formal financial services
    - From the unbanked side: assessing the barriers to FI through the perceived obstacles preventing them from having an account

Our hypothesis

- Usage and Barriers - Global Findex (2011): largest demand-side harmonized micro-data set ever collected (World Bank)
  - It is the first public database of indicators to offer a homogeneous measure for individual use of financial products across economies and over time
  - The survey collects information about 150,000 nationally representative and randomly selected adults from 148 countries around the world
- Access - Financial Access Survey (2014): Supply-side data on access (International Monetary Fund)
  - Annual data collected by countryâs authorities (generally, the central banks)
- Access - Camara *et. al.* (2015) Data on pure Banking correspondents

Construction of Variables for the usage dimension

- Account: adjusted number of account holders in a formal financial institution or post office over the total population: corrected by dormant accounts

- Saving: adjusted number of people who save in a formal financial institution over the total population: corrected by size of the potential demand, i.e. informal market

- Loan: adjusted number of people who have a loan from a formal financial institution over the total population: corrected by size of the potential demand, i.e. informal market

Construction of Variables for the access dimension

- Number of ATMs, bank branches and pure banking correspondents per population
- Note: Access variables related to mass land are not good proxies for access and also have poor explanatory power

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Construction of Variables for the barriers dimension
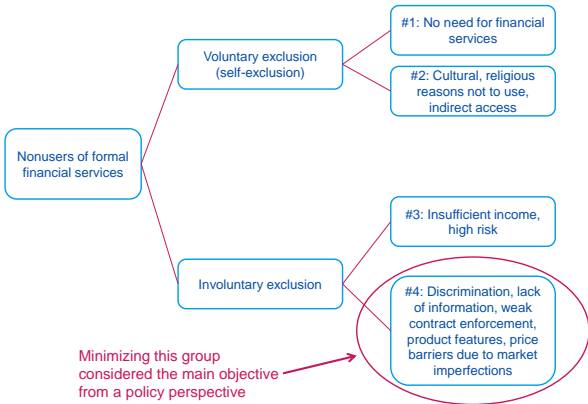
Construction of Variables for the barriers dimension

- Trust: number of unbanked who do not have a bank account because they do not trust the formal financial system, over the total population
- Affordability: number of unbanked who do not have a bank account because they perceive them to be too expensive, over the total population
- Distance: number of unbanked who do not have a bank account because they perceive that access points are too far away, over the total population
- Documents: number of unbanked who do not have a bank account because they perceive that lack the necessary documents, over the total population

Principal Component Analysis as an Indexing Strategy

- Our index covers 140 countries with data from 2011 and summarizes the information of about 18 FI-related indicators in an efficient way

- Two-step PCA

- We assume that behind our set of correlated variables we can find an underlying structure that can be identified with a latent variable that represents FI

- Standard regression techniques are unfeasible for these purposes

- A good composite index should comprise important information from all the indicators but not be strongly biased towards one or more of these indicators. We apply two-step principal components methodology to estimate the degree of FI as an indexing strategy

Principan Component Analysis as an Indexing Strategy

- First step: estimation of the three dimensions(usage, access and barriers)

$$
\begin{aligned}
Y_i^u &= \beta_1 account_i + \beta_2 savings_i + \beta_3 loan_i + u_i \\
Y_i^a &= \gamma_1 ATM_{popi} + \gamma_2 branch_{popi} + v_i \\
Y_i^b &= \theta_1 distance_i + \theta_2 affordability_i + \theta_3 documents_i + \theta_4 trust_i + \varepsilon_i
\end{aligned}
$$

i: denotes the country
(Y_i^u, Y_i^a, Y_i^b) is the dimension's vector where the subscripts u, a and b denote each dimension

- Second step: estimate of the dimension weights and the overall FI index (dimensions are the explanatory variables)

$$
FI_i = \alpha_1 Y_i^u + \alpha_2 Y_i^a + \alpha_3 Y_i^b + e_i,
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Dimensions: Principal Components Estimates

PRINCIPAL COMPONENTS ESTIMATES

Variable	PC_1	PC_2	PC_3	PC_4	norm. weight
Usage					
account	0.6087	-0.3009	-0.7341	-	0.28
saving	0.5959	-0.4375	0.6734	-	0.31
loan	0.5238	0.8474	0.087	-	0.40
Eigenvalues	2.34822	0.493829	0.157956	-	
Access					
Cbb and bc per pop.	0.7071	0.7071	-	-	0.67
ATMs per pop	0.7071	-0.7071	-	-	0.33
Eigenvalues	1.49002	0.509978	-	-	
Barriers					
Distance	0.5177	-0.3326	0.2659	-0.7421	0.23
Affordability	0.5152	-0.0996	-0.8452	0.1013	0.23
Documents	0.5157	-0.3292	0.4326	0.6623	0.26
Trust	0.4479	0.8781	0.167	-0.0213	0.29
Eigenvalues	3.22818	0.450135	0.192094	0.129595	

Notes: The weights are normalised add up to 1

Dimensions: Principal Components Estimates

PRINCIPAL COMPONENT ESTIMATES

		Financial Inclusion Index		
Variable	PC_1	PC_2	PC_3	norm. weight
Usage	0.5978	-0.2359	-0.7661	0.27
Access	0.5521	0.8141	0.1801	0.42
Barriers	0.5812	-0.5307	0.6169	0.32
Eigenvalues	2.30431	0.436375	0.259313	

Notes: The weights are normalised add up to 1

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Financial Inclusion Index Country Ranking					
Country	rank	Country	rank	Country	rank
Korea, Rep.	1	Italy	25	Trinidad and Tobago	49
Canada	2	Mongolia	26	Sri Lanka	50
Australia	3	Finland	27	Macedonia, FYR	51
Portugal	4	Malta	28	Lebanon	52
Spain	5	Latvia	29	Bosnia and Herzegovina	53
United States	6	Netherlands	30	Colombia	54
Luxembourg	7	Kuwait	31	Belarus	55
France	8	Greece	32	Chile	56
United Kingdom	9	Slovak Rep.	33	China	57
New Zealand	10	Singapore	34	Romania	58
Slovenia	11	Russian Federation	35	Kazakhstan	59
Ireland	12	Czech ReP.	36	Jamaica	60
Cyprus	13	Mauritius	37	Saudi Arabia	61
Austria	14	Lithuania	38	Ecuador	62
Japan	15	Hungary	39	South Africa	63
Germany	16	Hong Kong SAR, China	40	Dominican Republic	64
Croatia	17	Bulgaria	41	Bangladesh	65
Brazil	18	Poland	42	Turkey	66
Belgium	19	Costa Rica	43	Venezuela, RB	67
Denmark	20	Montenegro	44	Uruguay	68
Israel	21	Malaysia	45	Guatemala	69
Estonia	22	Serbia	46	Lao PDR	70
Thailand	23	United Arab Emirates	47	Georgia	71
Sweden	24	Qatar	48	Albania	72

Financial Inclusion Index Country Ranking *Cont.*					
Country	rank	Country	rank	Country	rank
Jordan	73	Honduras	97	Cameroon	121
Kosovo	74	Uzbekistan	98	Djibouti	122
Peru	75	Morocco	99	Guinea	123
Ukraine	76	Swaziland	100	Iraq	124
Vietnam	77	Cambodia	101	Togo	125
Paraguay	78	Zimbabwe	102	Tanzania	126
Armenia	79	El Salvador	103	Uganda	127
Argentina	80	Ghana	104	Liberia	128
India	81	Malawi	105	Benin	129
Azerbaijan	82	Botswana	106	Senegal	130
Mozambique	83	Indonesia	107	Tajikistan	131
Syrian Arab Rep.	84	Pakistan	108	Lesotho	132
Mexico	85	Moldova	109	Sudan	133
Egypt, Arab Rep.	86	Nigeria	110	Sierra Leone	134
Nepal	87	Nicaragua	111	Madagascar	135
West Bank and Gaza	88	Philippines	112	Chad	136
Bolivia	89	Congo, Rep.	113	Congo, Dem. Rep.	137
Algeria	90	Yemen, Rep.	114	Central African Rep.	138
Rwanda	91	Zambia	115	Afghanistan	139
Tunisia	92	Gabon	116	Niger	140
Kenya	93	Kyrgyz Rep.	117		
Comoros	94	Burundi	118		
Angola	95	Burkina Faso	119		
Panama	96	Mali	120		

Average of Financial Inclusion by Region	
Region	average
North America	0.88
Oceania	0.83
Western Europe	0.74
Eastern Europe	0.58
Asia	0.48
Latin America and the Caribbean	0.46
Africa	0.30

Financial Inclusion Index: Africa			
Country	rank	Country	rank
Africa	0.30	Gabon	0.30
Mauritius	0.61	Burundi	0.29
Trinidad and Tobago	0.55	Burkina Faso	0.29
South Africa	0.49	Mali	0.28
Mozambique	0.39	Cameroon	0.28
Egypt, Arab Rep.	0.39	Djibouti	0.27
Algeria	0.38	Guinea	0.26
Rwanda	0.37	Togo	0.25
Tunisia	0.37	Tanzania	0.24
Kenya	0.37	Uganda	0.24
Comoros	0.37	Liberia	0.24
Angola	0.37	Benin	0.23
Morocco	0.36	Senegal	0.23
Swaziland	0.35	Lesotho	0.23
Zimbabwe	0.35	Sudan	0.23
Ghana	0.35	Sierra Leone	0.22
Malawi	0.34	Madagascar	0.20
Botswana	0.34	Chad	0.18
Nigeria	0.32	Congo, Dem. Rep.	0.18
Congo, Rep.	0.31	Central African Rep.	0.16
Zambia	0.30	Niger	0.00

Financial Inclusion Index: LAC	
Country	rank
Latin America and the Caribbean	0.46
Brazil	0.74
Costa Rica	0.59
Colombia	0.53
Chile	0.52
Jamaica	0.51
Ecuador	0.49
Dominican Republic	0.49
Venezuela, RB	0.47
Uruguay	0.47
Guatemala	0.46
Peru	0.43
Paraguay	0.42
Argentina	0.41
Mexico	0.39
Bolivia	0.38
Panama	0.37
Honduras	0.37
El Salvador	0.35
Nicaragua	0.31

| Financial Inclusion Index: Asia			
Country	rank	Country	rank
Asia (0.45 without dev.)	0.48		
Korea, Rep.	1.00	Georgia	0.46
Japan	0.75	Jordan	0.45
Israel	0.72	Vietnam	0.42
Thailand	0.70	Armenia	0.41
Mongolia	0.68	India	0.41
Kuwait	0.66	Azerbaijan	0.40
Singapore	0.63	Syrian Arab Rep.	0.39
Hong Kong SAR, China	0.60	Nepal	0.38
Malaysia	0.56	West Bank and Gaza	0.38
United Arab Emirates	0.56	Uzbekistan	0.36
Qatar	0.56	Cambodia	0.35
Sri Lanka	0.54	Indonesia	0.34
Lebanon	0.53	Pakistan	0.33
China	0.52	Philippines	0.31
Kazakhstan	0.51	Yemen, Rep.	0.31
Saudi Arabia	0.50	Kyrgyz Rep.	0.29
Bangladesh	0.48	Iraq	0.26
Turkey	0.48	Tajikistan	0.23
Lao PDR	0.46	Afghanistan	0.14

FI and Income
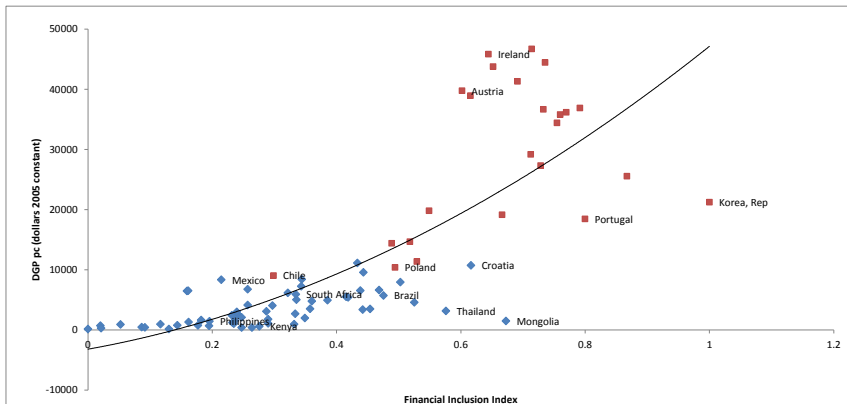
FI and Instability of Financial Systems
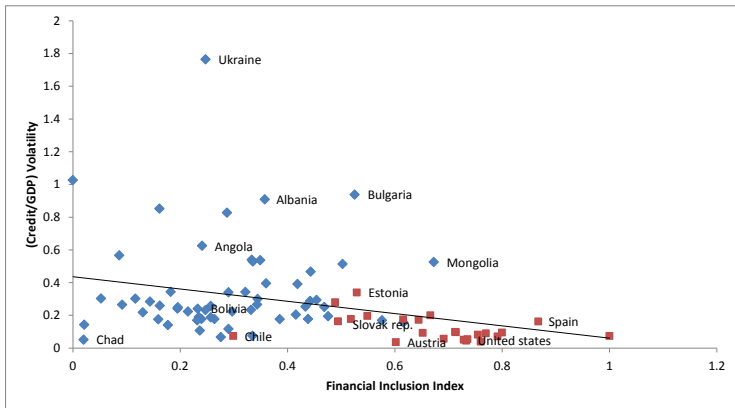
FI and Efficiency of Financial Systems
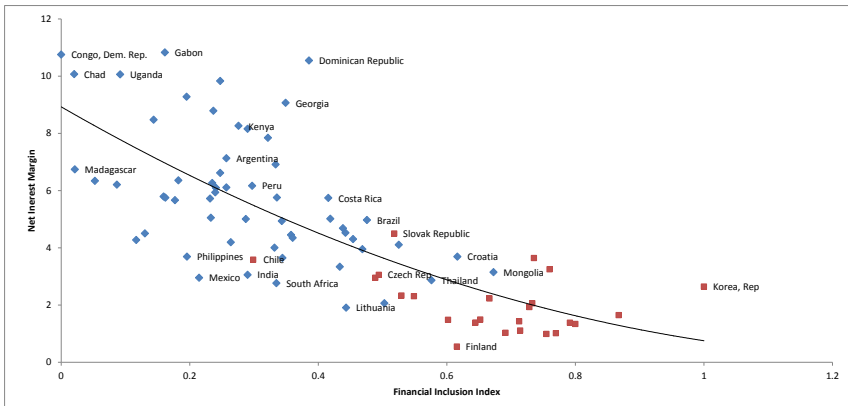
Conclusions

- We propose a methodology to measure the extent of FI from a multidimensional perspective

- It is easy to understand and compute

- Inclusiveness is determined by the maximization of usage of (banked) and access to formal financial services and by the minimization of obstacles causing involuntary exclusion (unbanked)

Conclusions

- Our index improves existing FI measures in different aspects:
  - We estimate the three sub-indices that explain FI and the overall composite index for FI that should be helpful for policymakers
  - The overall FI index, built with information from demand-side individual surveys and supply-side aggregate data, is the first index that includes such rich information
  - It combines information from two perspectives: the banked and unbanked populations
- Our index may be useful for investigating the determinants of financial inclusion as well as its contribution to economic growth and development

Thank you!

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