Measuring Financial Inclusion: A Multidimensional Index

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Outline

1. Motivation
2. Literature
3. Data
4. Econometric Strategy
5. Conclusions
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
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)
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?
Financial Inclusion Definition

- Usage
- Access
- Barriers

Financial Inclusion Index
Literature

- Analysis of individual FI-related indicators (Demirgüç-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 weights 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
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

  - 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

  - 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
Construction of Variables for the barriers dimension

Nonusers of formal financial services

Voluntary exclusion (self-exclusion)

Voluntary exclusion (self-exclusion)

#1: No need for financial services

#2: Cultural, religious reasons not to use, indirect access

Involuntary exclusion

#3: Insufficient income, high risk

#4: Discrimination, lack of information, weak contract enforcement, product features, price barriers due to market imperfections

Minimizing this group considered the main objective from a policy perspective
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.
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)
  \[ Y_i^u = \beta_1 account_i + \beta_2 savings_i + \beta_3 loan_i + u_i \]
  \[ Y_i^a = \gamma_1 ATM_{popi} + \gamma_2 branch_{popi} + v_i \]
  \[ Y_i^b = \theta_1 distance_i + \theta_2 affordability_i + \theta_3 documents_i + \theta_4 trust_i + \epsilon_i \]

  \( i \): 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)
  \[ FI_i = \alpha_1 Y_i^u + \alpha_2 Y_i^a + \alpha_3 Y_i^b + e_i, \]
## Dimensions: Principal Components Estimates

### Usage

<table>
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<tr>
<th>Variable</th>
<th>PC(_1)</th>
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<th>PC(_4)</th>
<th>norm. weight</th>
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| Eigenvalues | 2.34822 | 0.493829 | 0.157956 | -        |

### Access

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<td>0.7071</td>
<td>-</td>
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| Eigenvalues         | 1.49002  | 0.509978 | -        | -        |

### Barriers

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| Eigenvalues     | 3.22818  | 0.450135 | 0.192094 | 0.129595 |              |

**Notes:** The weights are normalised add up to 1
## Dimensions: Principal Components Estimates

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*Notes: The weights are normalised and add up to 1*
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<td>Central African Rep.</td>
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## Financial Inclusion Index: LAC

<table>
<thead>
<tr>
<th>Country</th>
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<tr>
<td>Latin America and the Caribbean</td>
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<td>Brazil</td>
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<td>Costa Rica</td>
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<td>Colombia</td>
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<td>Jamaica</td>
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<td>Ecuador</td>
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<td>Dominican Republic</td>
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<td>Country</td>
<td>rank</td>
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<tr>
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<td>Asia (0.45 without dev.)</td>
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<td>Korea, Rep.</td>
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<td>Japan</td>
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<td>United Arab Emirates</td>
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<td>Turkey</td>
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<td>Lao PDR</td>
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FI and Income

![Graph showing the relationship between Financial Inclusion Index and DGP pc (dollars 2005 constant). The graph includes data points for various countries such as Brazil, Croatia, Kenya, Mexico, Mongolia, Philippines, South Africa, Thailand, Austria, Chile, Ireland, Poland, Portugal, and Korea, Rep. The x-axis represents the Financial Inclusion Index, and the y-axis represents DGP pc (dollars 2005 constant).]
FI and Instability of Financial Systems

![Graph showing the relationship between Financial Inclusion Index and (Credit/GDP) Volatility](image)

**Countries**
- Angola
- Bolivia
- Bulgaria
- Chad
- Mongolia
- Ukraine
- Albania
- United States
- Austria
- Chile
- Slovak rep.
- Spain
- Estonia
- United States

**Axes**
- Financial Inclusion Index
- (Credit/GDP) Volatility
FI and Efficiency of Financial Systems

![Graph showing the relationship between Net Interest Margin and Financial Inclusion Index for various countries.](image-url)

- Argentina
- Brazil
- Chad
- Costa Rica
- Croatia
- Dominican Republic
- Gabon
- Georgia
- India
- Indonesia
- Kenya
- Lithuania
- Madagascar
- Mexico
- Mongolia
- Nepal
- Philippines
- Poland
- Portugal
- Romania
- South Africa
- Thailand
- Ukraine
- United States
- Vietnam
- Zambia

The graph illustrates the correlation between financial inclusion and net interest margins for a selection of countries, indicating that higher financial inclusion is associated with lower net interest margins.
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!

noelia.camara@bbva.com