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Linking Financial Inclusion and Development

GRADO EN ECONOMÍA

Sandra Carolina Férez Blando

Tutor: Fernando Alonso Guinea

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2. ABSTRACT

Introduction

Financial inclusion is the process that ensures access, usage and availability of the formal financial system to all members in an economy. The subject has been widely studied and several initiatives have been launched globally to promote financial inclusion to the population. Recognizing its importance to development, financial inclusion was also included in the UN's Millennium Goals. An all-inclusive financial system allows families to organize their income and to plan future expenses; and on a macro level, it builds entrepreneurial spirit and drives job creation. It also allows governments greater visibility of the fiscal system, facilitating improved legality of transactions. As such, it can be argued that financial inclusion is linked to development - this dissertation aims to answer this question, by testing whether financial inclusion and development are correlated.

Methodology

To test the hypothesis that financial inclusion and development are correlated, firstly financial inclusion was measured, and then a correlation was tested. Using updates to the Mandira Sarma 2011 Financial Inclusion Index, the study used a Simplified Average for Numerical Domestic Yields (SANDY) method, combined with updated data from the World Bank's 2011 Global Findex. The SANDY Method used Sarma's dimensions but included new categories and an amended formula to present a complete financial inclusion index. Countries were ranked between 1 and 0 to produce a spectrum from full financial inclusion to full exclusion respectively. The data were then correlated with the Human Development Index (HDI) of 2011, using Pearson's correlation coefficient.

Results

The SANDY method was employed for 20 countries, organized into 4 groups: the OECD, Europe, Asia and Africa. Canada had the highest rating (0.96) and Egypt presented total financial exclusion (0.00). The link between the new financial inclusion index and the HDI was $r = 0.86$, showing a strong positive correlation between financial inclusion and development.

Discussion

A strong positive relationship was found between financial inclusion and development. Of the twenty countries analyzed, the OECD group had the highest financial inclusion, however Mexico was an anomaly, with one of the lowest degrees of inclusion. The Europe group had the highest homogeneity of financial inclusion, due to EU regulation and encouragement to combat financial exclusion. The Asia group presented mixed results, with Singapore at the top and India at the bottom. Africa was the lowest group, with low development levels and low financial inclusion. Three exception countries were found, Mexico, India and Bangladesh; despite their high HDI, they have low financial inclusion ratings, explained by having an informal economy, specific development patterns and potential data limitations.

3. INTRODUCTION

3.1. FINANCIAL INCLUSION – BRIDGING ECONOMICS & SOCIETY

This is my dissertation and as I was brainstorming to choose the perfect topic, I reminded myself why I chose to become an Economist. Four years ago, when I enrolled at University I wanted to make a difference, to study something that could help others and therefore make a better world. I knew that Economics is the science of the correct distribution of resources, so back then I thought that if everyone had what they need, they should be happy and the world would be better off. Four years later I learnt that it is not so simple, but the basic principle still applies and ergo my motivation to become an Economist. I want a topic that matters, that is important, and that can help the development of several regions; hence I have chosen financial inclusion.

3.2. WHAT IS FINANCIAL INCLUSION?

Financial inclusion is the process that ensures access, usage and availability of the formal financial system to all members in an economy. It is important to have an all-inclusive financial system to facilitate the allocation of resources, which reduces the cost of capital. Also, easy access to financial services can help to improve daily transactions and reduce the use of often-exploitative informal credits (Pais, 2010). The provision of safe and secure saving practices enhances the efficiency and welfare of a financial system. Financial Inclusion is a familiar concept in many countries, and in recent years it has become a policy priority for governments worldwide. The United States took legislative measures in 1997 through the Community Reinvestment Act, which obliges banks to offer credits to everyone, not just the wealthy. In France in 1998 the law of exclusion was approved, which stresses every individual's right to hold a bank account (Pais, 2010).

All-inclusive policies were also taken by the banking sector; the Reserve Bank of India offers "General Credit Cards" to encourage wider participation in personal borrowing. On 2004, the "Mzansi" low cost bank account was established in South Africa to target excluded individuals. Micro-finance institutions also provide a viable alternative to banks by providing similar services to people who are not yet ready to join the formal system (Sarma, 2011).

As a subject, financial inclusion has been widely discussed, with different authors offering different definitions; in 2008 the Government Committee on financial inclusion in India defined it as "the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as the weaker sections and low income groups at an affordable cost" (Rangarajan Committee, 2008). Earlier, in 2006, Mohan argued "financial exclusion signifies the lack of access by certain segments of society to appropriate low-cost, fair and safe financial products and services from mainstream providers" (Mohan, 2006). Conroy had argued previously that "financial exclusion is a process that prevents poor and disadvantaged social

groups from gaining access to the formal financial systems of their countries” (Conroy, 2005). That year, Carbo defined financial exclusion as “broadly the inability (however occasioned) of some social groups to access the financial system (Carbo, 2005). Ten years prior, Leyshon and Thrift recognized exclusion as “those processes that serve to prevent certain social groups and individuals from gaining access to the formal financial system” (1995). This wide body of literature demonstrates the importance accorded to financial inclusion, due both to its positive contribution on a macroeconomic level and on an individual level. Further this suggests that financial inclusion can provide a road towards development throughout the world.

Building on existing literature, the paper of Sarma and Pais (2010) attempts to find the relationship between financial inclusion and the economic development of the several countries, finding a positive correlation. This research was based on Beck’s previous studies of the financial sector’s outreach by using cross-country data (Beck, 2007).

3.3. WHY FINANCIAL INCLUSION IS IMPORTANT AND HOW IT AFFECTS DEVELOPMENT

Nowadays, the concept of financial inclusion has developed a high profile. It featured amongst the UN’s Millennium Development Goals, and since, numerous economic policies have been established to encourage broader participation in the formal financial sector. The World Bank and the International Monetary Fund now provide studies, statistics and surveys on how different countries work to increase participation in formal finance. In 2008 the Centre of Financial Inclusion (CFI) was established with the aim of achieving full inclusion worldwide (CFI, 2008). Similarly, in 2009 the Bill & Melinda Gates Foundation started the Alliance for Financial Inclusion (AFI) to encourage and enable financial policymakers to share information, aiming to create a knowledge base to implement effective policies to achieve inclusion (AFI, 2009). All of this illustrates the global importance accorded to financial inclusion.

An inclusive financial system brings both macro and micro benefits. On a micro scale, families are better able to organize their incomes, and having

access to credits and microfinance allows them to plan their expenses and pay for an education plan, which provides them with the opportunity for a better future. Also, through credits, a nation can develop an entrepreneurial spirit, so people can set up small business, reflecting positively in the national economic output (FE Report, 2012). Another benefit of financial inclusion is that new bank branches must be opened to reach all areas (as well as back office operations staff), which creates jobs, thus reducing unemployment. In the USA, a country with high financial inclusion, 2.5% of the population works in financial services¹.

Furthermore, financial inclusion will help develop infrastructure to encourage spending; countries need strong internal demand and financial inclusion can provide that (CFI, 2008).

On a macro scale, participation in the formal financial system better enables governments to trace money, so tax collection will be simplified and greater funds will become available for investment in development initiatives (AFI, 2009). Also, formal financial systems can prevent and detect money laundering; as such, an inclusive financial system can reduce other types of organised crime, such as trafficking, financing terrorism, the illegal arms trade and corruption. In the long term, it will align nations to more developed countries by building a financial system compatible with global standards, like VISA, MasterCard, IBAN and Swift (AFI, 2009). This will increase global competitiveness and will drive forward regulatory measures that boost investor confidence, eventually attracting foreign direct investment (CFI, 2008). Another important feature about financial inclusion is that provides a basis for other development infrastructure, by allowing investment in large public projects like public private partnerships (PPP) in transport, health and education. For all these reasons financial inclusion is an important area of Economics (CFI, 2008).

¹ Population figure provided by US Census Bureau and employment figure by the Bureau of Labor Statistics

3.4. MEASURING FINANCIAL INCLUSION & THE NEED FOR AN IMPROVED MEASUREMENT METHODOLOGY

As discussed above, financial inclusion provides path to increased development, however to date, no index exists to measure the degree of financial inclusion in every country.

Mandira Sarma in 2011 proposed a multidimensional index to rank financial inclusion in different countries, but this measure was found to be flawed, which will be explained further. Attempts have been made previously to produce such an index; Honohan in 2008 tried to estimate the number of households that use formal financial services by conducting an econometric study. Ardic in 2011 used this data to produce his own interpretation of the level of exclusion (Pais, 2010). Financial inclusion can also be measured through other means, for example banking sector indicators, such as the annual report to prepare economic policies to promote inclusion; the Bank of India uses this method. The financial inclusion index (IFI) presented by Sarma was first introduced in 2008, and has been updated yearly since, up to 2012. However all of these approaches, although useful in providing information on specific areas of financial inclusion, are limited and weak, (explained in detail further down), so a new and complete financial inclusion index will be proposed herein.

Previous authors simply used the number of bank accounts (per 1,000 adults) as the indicator for financial inclusion, but Sarma adds to this the number of branches, the number of ATMs (per 1,000 people), and the number of credit and deposit accounts. Beck in 2007 attempted to produce an index similar to this, but he failed because he used individual data, which led to biased results (Sarma, 2011).

Sarma uses the following definition for financial inclusion: “a process that ensures the ease of access, availability and usage of the formal financial system for all the members in an economy” (Sarma, 2011). She proposes three dimensions to comprise financial inclusion: penetration, usage and availability; as such, these form the basis of this index.

Sarma's main differentiator (and improvement) was to incorporate information on several dimensions. The IFI she proposed takes values from 0 to 1, 0 meaning total financial exclusion and 1 total inclusion; resulting in an index that was simple to produce and compute and is readily comparable across different countries.

The methodology behind the IFI has an analogous approach to the one used to build development indexes such as the GDI, HDI, and the HPI. The first step was to compute a dimension index for every dimension (Sarma, 2011). The following formula was used:

$$IFI = 1 - \frac{\sqrt{(1 - d_1)^2 + (1 - d_2)^2 + \dots + (1 - d_n)^2}}{\sqrt{n}}$$

Figure 3.1: Sarma's 2011 IFI formula

In this case all the dimensions are equally important. The IFI can be computed at different points in time.

Sarma uses three different dimensions; the first one is Banking Penetration (p_i). To measure this originally she intended to use data showing the size of the "banked" population, but as that information was not available, she used the number of bank accounts as a proportion of the total adult population. Since these data are the most important in determining if an individual is included in the financial system, this dimension has a weight of 1 (Sarma, 2011).

The second dimension presented by Sarma is the Availability of banking services (a_i) because she argues that an all-inclusive system must be readily available to everyone. To measure this Sarma used the number of bank branches and ATMs per 100,000 people. These two formed the second dimension, based on bank branches comprising 2/3 of the weight and ATMs comprising 1/3. The total weight for this dimension was 0.5 (Sarma, 2011).

The third and final dimension was Usage (u_i) because of countries where many bank branches exist and people hold accounts, but they do not widely use them. Accordingly this dimension aims to measure how much these services are utilized in practice. Sarma used data on the number of credits and

debits as a proportion of each country's GDP. This dimension also has a total weight of 0.5 (Sarma, 2011).

The weights of the dimensions differ based on different availability of information to measure each. Data for the amount of people who have a bank account is readily available since most countries collate and publish it. However for the availability dimension, data for the usage of the internet for mobile banking is not completely accurate and not all countries publish it, so this introduces bias in favor of more developed countries. For the usage dimension, the data include information on the volume of transfers, payments and remittances, which again limits the data this index can provide according to the availability of this data (Sarma, 2011).

So the formula used by Sarma to compute the IFI is the following:

$$IFI = 1 - \frac{\sqrt{(1 - p_i)^2 + (.5 - a_i)^2 + (.5 - u_i)^2}}{1.5}$$

Figure 3.2: Sarma's IFI equation

Even though the IFI is computed similarly to the method used by UNDP, the main difference is that the IFI is based on a measure of the distance from the ideal, while the HDI and GDI are simple arithmetic averages. Sarma chose this approach because as proven by Nathan, this satisfies the NAMPUS properties (normalization, symmetry, monotonicity, proximity, uniformity and signaling) (Nathan, 2008). The UNDP method only covers three of these properties; it fails on covering the "perfect sustainability". Therefore if there is an increase of 1 in one dimension then this can be balanced by a decrease of 1 in another. Fortunately the distance-based approach used by Sarma has no such limitations (Nathan, 2008).

The data to compute the dimensions was sourced from different institutions. Sarma used the 2006 World Development Indicators from the World Bank; this database was updated until 2004 and only contained information on 99 of 209 countries. So she complemented this with data from the World Bank's Research Department and Financial Sector and Operations Policy Department (Sarma, 2011) for the banking penetration dimension. Usage data from the International Monetary Fund (IMF) was gathered to measure deposits and

credits. Information for the Availability dimension also came from the World Development Indicators from 2006 of the World Bank.

After collating all this information Sarma only had full data for 54 countries of the 99 initial countries. However this still left some outliers from the overseas financial centres (OFC) so ultimately only 49 countries had data that was possible to use (Sarma, 2011).

Depending on the result for the value of the IFI, she divided countries into three different categories

1. From 0.5 to 1.0 = high financial inclusion
2. From 0.3 to 0.5 = medium financial inclusion
3. From 0 to 0.3 = low financial inclusion.

Figure 3.3: Divisions of financial inclusion

Here are the results Sarma presented: Austria was rated highest at 0.953 and Madagascar the lowest at 0.009. The countries with the highest IFI are from the OECD, although there were exceptions such as Iran and Thailand, which ranked unexpectedly high. But overall, of 49 countries, 30 belong to the low financial inclusion category, which included some middle-income countries such as Brazil and Mexico. The fact that Sarma obtained quite drastic results (most of the countries lie in the low inclusion category) hints at a possible flaw in her methodology; as an important factor was missing that could be an inflexion point between the middle and low inclusion groups (Sarma, 2011).

By comparing this index to the one presented by the European Commission (EC), most countries have similar ranks with both approaches, but the notable exceptions are France, Spain and Greece, which rank higher by the Sarma IFI than the EC one. The author explains that this is because her IFI is dynamic and considers different dimensions to the EC index (Sarma, 2011).

Norway is the main exception in this index, which is surprisingly rated very low with an IFI of 0.595. This can be explained by the fact the this country has a particularly advanced financial system and it was difficult to obtain data on internet banking, so the author dismissed this category, explaining why Norway has such a counterintuitive result.

Overall, this index has many strengths and the results appear logical when compared to similar literature. But it has also numerous flaws, including the limited information available, the age of the information used (2006 and 2004 are considered old compared to the dynamics of the financial world), making that data of limited use currently.

3.5. RESEARCH QUESTION – TESTING THE LINK BETWEEN FINANCIAL INCLUSION & DEVELOPMENT

Many developmental benefits arise from inclusion in the financial sector. Helping poor communities join the system allows them access to opportunities that would be impossible without financial aid. The simple idea of allowing everyone in a country to participate in a formal financial system by holding a bank account and understanding the financial services available can quickly increase development levels.

Given this research it seems logical to assume that countries with a high degree of financial inclusion will also have high development. However a challenge exists in that there is no way to correctly measure financial inclusion, because the index proposed by Sarma is limited and flawed, as discussed above.

Therefore, this study will test two hypotheses:

- The null hypothesis – there is no link between development and financial inclusion
- The alternative hypothesis – development and financial inclusion are correlated

In order to test these hypotheses, it is necessary first to build an updated and complete financial inclusion index that does not suffer from Sarma's biases. Then with the information that the new financial index provides, to compute the correlation coefficient between the new IFI and the HDI, answering the research question of whether or not the alternative hypothesis is correct.

4. METHODOLOGY

4.1. IMPROVING MEASUREMENT OF FINANCIAL INCLUSION THROUGH THE DEVELOPMENT OF A NEW INDEX

The methodology behind this index will follow a Simplified Average for Numerical Domestic Yields (SANDY) for financial inclusion. This index will gather information from the World Bank and categorize it into different dimensions, total them, and then giving them different weights for their importance to the financial sector, before finally assigning a 1 to the highest value and a 0 to the lowest. Under the SANDY Method for financial inclusion, this index is designed to keep track of the progress of any economy in the world with respect to financial inclusion over time.

The first step in building this index was selecting the countries and dividing them into four categories of five countries. This division is shown below.

OECD	Europe	Asia	Africa
Australia	United Kingdom	Singapore	South Africa
Canada	France	Thailand	Somalia
United States	Germany	Malaysia	Nigeria
Japan	Spain	Bangladesh	Uganda
Mexico	Italy	India	Egypt, Arab Rep.

Figure 4.1: Country groupings

The next step was to gather the source data, which was obtained from the World Bank, specifically the Global Financial Inclusion Index (Global Findex). This contains information regarding the key financial indicators (updated to 2011). The data are presented as percentages of the total population and comprise different categories for 164 available countries (World Bank, 2011).

This index will be built as closely as possible to that built by Sarma; therefore the same three dimensions will still be presented. The difference is that now Usage and Availability be calculated using more indicators to improve the completeness of the index and thus the accuracy of its results.

There are 36 selected categories to define the new financial inclusion index. These were then divided between the dimensions; the following table presents the distribution. (All of them are measured as a percentage with an account, age 15+) (World Bank, 2011).

Penetration	Usage	Availability
Account at a formal financial institution	3+ deposits in a typical month	ATM is main mode of deposits
	3+ withdrawals in a typical month	ATM is main mode of withdrawal
	Account used for business purposes	Bank agent is main mode of deposit
	Account used to receive government payments	Bank agent is main mode of withdrawal
	Account used to receive remittances	Bank teller is main mode of deposit
	Account used to receive wages	Bank teller is main mode of withdrawal
	Loan from a financial institution in the past year	Checks used to make payments
	Loan from a private lender in the past year	Credit card
	Loan from an employer in the past year	Debit card
	Loan from family or friends in the past year	Electronic payments used for payments
	Loan in the past year	Mobile phone used to pay bills
	Loan through store credit in the past year	Mobile phone used to receive money
	Outstanding loan for health or emergencies	Retail store is main mode of deposit
	Outstanding loan for home construction	Retail store is main mode of withdrawal
	Saved any money in the past year	

	Saved at a financial institution in the past year	
	Saved for emergencies in the past year	
	Saved for future expenses in the past year	
	Saved using a savings club in the past year	
	Saved any money in the past year	
	Saved at a financial institution in the past year	

Figure 4.2: IFI dimensions

It is important to remark that in Sarma's conclusions she states that her index lacks depth because the dimensions lack information, and establishes the need to measure online payments and remittances; both of which are now included in this index (Sarma, 2011).

The next step is to compute the value for each dimension. Banking Penetration only has 1 category, so is the simplest to compute.

Penetration		
	Account owner	d1
Australia	99.1	1
Singapore	98.2	0.99
Germany	98.1	0.99
United Kingdom	97.2	0.98
France	97.0	0.98
Japan	96.4	0.97
Canada	95.8	0.96
Spain	93.3	0.93
High income	90.5	0.90
United States	88.0	0.88
Thailand	72.7	0.70
Italy	71.0	0.69
Malaysia	66.2	0.63
South Africa	53.6	0.49
World	50.5	0.46
Middle income	43.3	0.37
Bangladesh	39.6	0.33
India	35.2	0.28

Somalia	31.0	0.24
Nigeria	29.7	0.22
Mexico	27.4	0.20
Low income	23.7	0.16
Uganda	20.5	0.12
Egypt, Arab Rep.	9.7	0

Figure 4.3: Penetration rankings

The second column is the percentage of the population above 15 years old who hold an account with a formal financial institution. The countries have been rearranged in descending order. Information about the world average, high, middle and low-income countries has also been included for reference. Notice how; by measuring the first dimension already the high income countries have a higher ranking than the low-income countries. The world average is in the middle of the whole dimension, but is slightly reduced (by 0.04) by the data being skewed downwards by lower income countries. Singapore has an expectedly high ranking explained by its high level of development, strong commercial sector and financial strength (Loke, 2007). On the other hand Mexico, despite being in the OECD, is just above the average of the low-income countries. This is explained further in subsequent commentary.

The main objective of an index is to present the information on a scale from 0 to 1, with 1 being the highest, in this case, total financial inclusion, and 0 being the opposite, financial exclusion. This is shown in the third column.

To compute the index, the data was converted using the process detailed below:

1. Determine the maximum value (this will be the limit), in this case that is 99.1
2. Determine the difference between maximum and the minimum value, in this case: $99.1 - 9.7 = 89.3$
3. Use the following formula: $\{[89.3 - (99.1 - \text{next country value})] / 89.3\}$

Figure 4.4: Determining rankings to calculate Penetration

By following those steps the highest value (Australia in this case) has a value of 1 and Egypt (which has the lowest number of people holding an account at a formal financial institution), scores a 0. Therefore all other countries have a value between these two limits.

The second dimension, usage, has the most categories, so these were divided into 5 different subcategories as below.

0.2	Deposits	3+ deposits in a typical month
0.1	Withdrawals	3+ withdrawals in a typical month
0.1	Income	Account used for business purposes
		Account used to receive government payments
		Account used to receive remittances
		Account used to receive wages
0.3	Loans	Loan from a financial institution in the past year
		Loan from a private lender in the past year
		Loan from an employer in the past year
		Loan from family or friends in the past year
		Loan in the past year
		Loan through store credit in the past year
		Outstanding loan for health or emergencies
		Outstanding loan for home construction
		Outstanding loan to pay school fees
		Outstanding loan to purchase a home
0.3	Savings	Saved any money in the past year
		Saved at a financial institution in the past year
		Saved for emergencies in the past year
		Saved for future expenses in the past year
		Saved using a savings club in the past year
1	Total	

Figure 4.5: Usage categories

The five usage subcategories are: deposits, withdrawals, income, loans and savings. Sarma's IFI only included credits and deposits; whilst the updates made to this dimension aim to include all the possible ways that clients can use the financial system, providing a more holistic view (World Bank, 2011).

The methodology to measure this dimension is simple and clear, once the subcategories are established, the next step is to take the average of each

of them. The aim is to reduce the information from 21 numbers to 5 and work with these. Then, each number is multiplied by the weight given in the table.

These weights have been chosen based on the information given in interviews from Sinclair (Sinclair, 2001). For example, savings and loans have the highest weights because these are the two variables that could attract poor people to join a formal financial institution. The option to access a loan opens up new possibilities to those people who have insufficient funds to start a university education, buy a car or a buy a house. This drives the microfinance business and other payment planning schemes. Conversely, savings are also particularly important to these sectors, helping people to manage their income so that they have extra funds available in case of a 'rainy day' (Sinclair, 2001). The fact that deposits have a weight of 0.2 is a proxy measure of the informal versus the formal finance institutions. If a country presents a high deposit levels it means that these transactions can be tracked and proven, representing active participation in a formal economy. On the other hand, if this number is low, then these payments are not being registered, suggesting an informal scheme.

The next step is to add up all 5 subcategories to obtain a single value for each country. The addition was made twice, firstly where each subcategory was the same weight, so just a simple average, and then factoring in the corresponding weights. The values for the low-income countries are generally similar, taking the equal of different weights, but these differences grow for the high-income group. When using different values for each category, these countries' numbers for the usage dimension are lower than if just taking all as equal. This is explained by the savings and loans data itself; of these 20 countries there is a maximum of 19.8% (Australia) and a minimum of 8.8% (Egypt), so the difference between these limits is approximately 11%, which is relatively small. On the contrary, the income subcategory has a maximum of 45.5% again in Australia, and a minimum of 1.12% in Egypt – a much broader variation. These differences between high and low-income countries explain why the OECD and some European countries appear to be affected from these weights. Considering these weights has helped to position all countries in similar conditions given their individual preferences in the usage of financial

services, which is why the following calculations will be executed using the different weighted average.

Usage		
	all	d3
Canada	43.33	1.00
United States	39.27	0.89
Australia	39.19	0.89
United Kingdom	37.35	0.84
France	35.60	0.79
High income	32.57	0.71
Germany	29.82	0.63
Japan	27.45	0.57
Spain	26.20	0.53
Singapore	26.18	0.53
Italy	20.04	0.37
Somalia	17.58	0.30
South Africa	16.34	0.27
World	14.95	0.23
Malaysia	14.85	0.23
Mexico	13.15	0.18
Thailand	12.80	0.17
Middle income	11.13	0.13
Uganda	10.96	0.12
Nigeria	9.97	0.09
Low income	8.36	0.05
India	7.84	0.04
Egypt, Arab Rep.	6.64	0.00
Bangladesh	6.49	0.00

Figure 4.6: Usage rankings

The second column shows the number given after summing all the subdivisions with their respective weights. The third column is the value for the usage dimension. This was computed the same way as the dimension 1. In this case the formula was:

$$\{[39.8 - (43.4 - \text{next country value})] / 39.8\}$$

Figure 4.7: Calculating Usage

The country that uses the most the financial institutions is Australia, followed by the OECD group, except for Mexico, which although low ranking, has a better position than in the first dimension. Once again a clear division of the high, middle and low ranking countries exists, and the world average is located again lower than the mean. Egypt and India have the lowest rankings.

The third and final dimension to be calculated is availability. To measure this, some subcategories were created. These were divided as per the table below:

Availability		
0.1	ATMS	ATM is main mode of deposit ATM is main mode of withdrawal
0.1	Bank Tellers	Bank agent is main mode of deposit Bank agent is main mode of withdrawal Bank teller is main mode of deposit Bank teller is main mode of withdrawal
0.1	Checks	Checks used to make payments
0.2	Credit Card	Credit card
0.1	Debit Card	Debit card
0.1	www.	Electronic payments used to make payments
0.2	Phones	Mobile phone used to pay bills Mobile phone used to receive money
0.1	Retail Stores	Retail store is main mode of deposit Retail store is main mode of withdrawal
1	Total	

Figure 4.8: Availability categories

This dimension is built on eight subcategories, ATMs, bank tellers, checks, credit cards, debit cards, internet, phones and retail stores. All have different weights depending on the information that is most relevant to determine the availability of the formal financial system in these countries (World Bank, 2011).

Data from the World Bank had no information on the availability of mobile phones in the banking sector for high-income countries, so the OECD (except for Mexico and the Europe group) had no such data. This information shows the importance of mobile banking for middle and low-income countries, which

explains the weight of 0.2, because for these, mobile banking is the solution when branches cannot open due to large rural and remote areas.

Credit cards has a 0.2 weight because opening a credit line can be very appealing and a key decision factor to participate in a formal financial system (Sinclair, 2001).

This methodology shows a more complete availability dimension than that presented by Sarma, because this one included the online banking information, which was limited on her index (Sarma, 2011).

The procedure was the same as in the second dimension, first a simple average of each subcategory was calculated and then each one was multiplied by the weight given on the table. Once again, the dimension was computed with equal values and different weights, but in this case the differences between both are small for all countries. Regardless, for further calculations, the different weights result will be the one used. The results are as follows:

Availability		
	All	d2
Australia	44.61	1.00
United States	42.46	0.95
Canada	42.23	0.94
United Kingdom	36.28	0.79
Germany	35.64	0.77
High income	33.27	0.71
Singapore	31.81	0.68
France	31.01	0.66
Somalia	27.30	0.56
Japan	27.14	0.56
Nigeria	25.86	0.53
Spain	25.44	0.52
Thailand	22.09	0.43
Malaysia	20.63	0.40
Uganda	19.62	0.37
South Africa	18.54	0.34
Mexico	17.34	0.31
World	17.08	0.31
Low income	16.11	0.28
Bangladesh	16.10	0.28
Italy	13.78	0.22
Middle income	13.39	0.21

India	11.15	0.16
Egypt, Arab Rep.	4.93	0.00

Figure 4.9: Availability rankings

The second column presents the results from the weighted average of all subcategories. The third column shows the value for the third and final dimension; calculated using the following formula:

$$\{[36.6 - (46.6 - \text{next country value})] / 36.6\}$$

Figure 4.10: Calculating Availability

Canada ranks highest, followed by the OECD and Europe groups; Japan and Singapore also have high positions. Of the three dimensions, Mexico performs best here. India, Egypt and Bangladesh are located at the bottom.

Now that the values for each dimension have been computed, the next and final step is to compute the new IFI. To do so, the methodology laid out by Sarma will be followed, but the formula will be modified to present stronger, more accurate results. The formula is the following:

$$IFI = 1 - \frac{\sqrt{(1 - d_{1i})^2 + .5(1 - d_{2i})^2 + .5(1 - d_{3i})^2}}{2}$$

Figure 4.11: Updated IFI formula

Notice how in essence the formula remains unchanged from the Sarma model; this is to conserve NAMBUS properties proposed by Nathan, thereby using a distance-based approach (Nathan, 2008). The difference is not in the structure of the equation but in the algebra. By analyzing Sarma's model and computing her individual results of each dimension into the proposed formula, her IFI final results were impossible to reach. This is because her denominator should have been 2, as this is the result from adding the weight of each dimension $1 + 0.5 + 0.5 = 2$. In this new IFI, the numerator first computes the

value of each dimension and then multiplies by the weight; otherwise the final result is inaccurate. Under these observations, the formula for the new IFI was built. The weights of each dimension proposed by Sarma were left unchanged to allow direct comparison of both indexes.

4.2. MEASURING DEVELOPMENT

The development of countries was measured with the Human Development Index. Mahbub ul Haq based this on the ideas from Amartya Sen, first introduced in 1990. It is a simple trivariable average of health, education and income (Klugman, 2011). The HDI takes the mean from the addition of the GDP per capita, the life expectancy and the literacy rate. As such it calculates development without purely being based on income. The methodology behind it is similar to that used in the new financial inclusion index, because both satisfy the NAMBUS properties (Nathan, 2008). The HDI has been successful due to its simplicity to compute and to understand. According to the New York Times the HDI has been the “only one measure that has succeeded in challenging the hegemony of growth-centric thinking” (Klugman, 2011). It is for these reasons that the HDI has been chosen as the measure of development in this study.

The HDI is published annually by the United Nations Development Program, and is computed for the majority of countries; unfortunately Somalia’s HDI has not been computed yet (UNDP, 2011).

4.3. LINKING DEVELOPMENT & FI

The best way to prove whether the null hypothesis that with a high financial inclusion comes a high degree of development is by computing Pearson’s correlation coefficient (AERD, 2007) by using the following formula:

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{(\sum X^2 - \frac{(\sum X)^2}{N})(\sum Y^2 - \frac{(\sum Y)^2}{N})}}$$

Figure 4.12: Pearson’s correlation formula

X represents values from the new financial inclusion index, and Y the HDI for 2011 (the same year used for the new IFI). Once the values for the new financial inclusion index are computed, the correlation coefficient will be presented.

5. RESULTS

5.1. NEW MEASUREMENTS OF FINANCIAL INCLUSION

The results from applying the new value for each dimension into this formula are as below:

	Penetration	Usage	Availability	IFI	Ranking
	d1	d2	d3		
Canada	0.96	0.94	1.00	0.96	1
Australia	1.00	1.00	0.89	0.94	2
United States	0.88	0.95	0.89	0.89	3
Mexico	0.20	0.31	0.18	0.22	17
Japan	0.97	0.56	0.57	0.69	8
France	0.98	0.66	0.79	0.80	5
Spain	0.93	0.52	0.53	0.66	9
Germany	0.99	0.77	0.63	0.78	6
United Kingdom	0.98	0.79	0.84	0.87	4
Italy	0.69	0.22	0.37	0.45	11
India	0.28	0.16	0.04	0.18	18
Malaysia	0.63	0.40	0.23	0.44	12
Thailand	0.70	0.43	0.17	0.46	10
Bangladesh	0.33	0.28	0.00	0.22	16
Singapore	0.99	0.68	0.53	0.72	7
South Africa	0.49	0.34	0.27	0.39	13

Egypt, Arab Rep.	0.00	0.00	0.00	0.00	20
Uganda	0.12	0.37	0.12	0.18	19
Nigeria	0.22	0.53	0.09	0.25	15
Somalia	0.24	0.56	0.30	0.32	14
World	0.46	0.31	0.23	0.35	13 & 14
Low income	0.16	0.28	0.05	0.16	19&20
Middle income	0.37	0.21	0.13	0.26	14 & 15
High income	0.90	0.71	0.71	0.78	5 & 6

Figure 5.1: Results of new IFI

The new IFI ranks Canada as having the highest financial inclusion, with an IFI value of 0.96, and Egypt with the highest level of exclusion, with a value of 0. This table shows that countries from the OECD and Europe have the highest values, and that Mexico has a low rank compared to its income; this will be elaborated on in the discussion section.

Overall, this new IFI offers a solid and complete base of information (Center of Financial Inclusion, 2009), which affords a high confidence level.

Based on her results, Sarma classified the countries according to their IFI value; this new IFI will modify this classification as follows (Sarma, 2011):

1. From 0.7 to 1.0 = very high financial inclusion
2. From 0.5 to 0.7 = high financial inclusion
3. From 0.3 to 0.5 = medium financial inclusion
4. From 0 to 0.3 = low financial inclusion.

Figure 5.2: New IFI categories

When applying the above distribution, of the twenty countries that had their IFI computed using the new method, 7 have a very high financial inclusion, 4 high, 4 medium and 5 low financial inclusion. Countries were selected so that their characteristics resulted in a wholesome index that could hold all their peculiarities.

5.2. CORRELATING FINANCIAL INCLUSION & DEVELOPMENT

The following table shows values for the new financial inclusion index and human development index. Calculating a Pearson Correlation Coefficient using this data yields a value of $r = 0.86$, showing a strong positive correlation between the degree of financial inclusion and the level of development in each country.

	Ranking	IFI	HDI
Canada	1	0.96	0.91
Australia	2	0.94	0.94
United States	3	0.89	0.94
United Kingdom	4	0.87	0.88
France	5	0.80	0.89
High income		0.78	0.90
Germany	6	0.78	0.92
Singapore	7	0.72	0.89
Japan	8	0.69	0.91
Spain	9	0.66	0.89
Thailand	10	0.46	0.69
Italy	11	0.45	0.88
Malaysia	12	0.44	0.77
South Africa	13	0.39	0.62
Somalia	14	0.32	..
Nigeria	15	0.25	0.47
Bangladesh	16	0.22	0.51
Mexico	17	0.22	0.77
India	18	0.18	0.55
Uganda	19	0.18	0.45
Egypt, Arab Rep.	20	0.00	0.66
Correlation	$r = 0.86$		

Figure 5.3: Results of new IFI & HDI correlation

6. DISCUSSION

The results show a strong, positive correlation between the degree of financial inclusion and the level of development for each country, thus supporting the alternative hypothesis. To logically present the outcomes from the relationship between the new IFI and the HDI, countries are categorized below into four different groups, each one with five countries (also in line with the prior grouping of similar countries in the method).

6.1. THE OECD GROUP

Members of the OECD form the first group; intuitively they should have the highest degree of financial inclusion because of their high levels of development. The index aligned with the experimental hypothesis, Canada, Australia and the United States, are the leaders for inclusion. Japan follows slightly behind, occupying eighth position, and in this case Mexico is the exception, finishing at the bottom with the seventeenth position.

Japan ranks low in financial inclusion due to high levels of migrant workers in the manufacturing sector who do not officially register their remittances. This suggests a large gap between the services provided by the authorized financial institutions and the real requirements of the remitters. The only solution is for banks to recognize the resident foreigners as a market segment and to try to incorporate them into the formal system. This is not an easy task due to the language barrier and the issue of the administration and security to avoid money laundering. Recently new legislation has been approved specifically to address this difficulty – for example, now a variety of non-bank service providers can offer remittance and payment services to this excluded sector of the population. Hopefully in the coming years, the Japanese financial inclusion ranking will catch up with the remainder of the OECD group (Conroy, 2009).

Mexico is the paradox of this study; it presents a very high value for development: 0.77 that places it between the high income and the middle income for development. However according to this financial inclusion index it has one of the lowest degrees with 0.22. This significant gap between those two

indexes is explained in the following way. According to the report “Mexico’s Prospects for Full Financial Inclusion” (Center of Financial Inclusion, 2009), there are many of opportunity areas for this country. For example one significant issue is that households are not providing data correctly, so information from the World Bank suffers from bias. However more problems exist; credit and saving schemes must become more affordable to reach more users: the total annual cost of credits is around 53% for a commercial loan and 75% for a consumer loan; therefore borrowing in Mexico is very expensive, so most people avoid it. Around 71% of the Mexican households are either poor or rural (Center of Financial Inclusion, 2009), meaning that a large sector of the population has limited access to financial services. The biggest obstacle is that around 63% of the economy belongs to the informal sector; which is formed by people who have limited interest in declaring their earnings; therefore they do not wish to participate in a formal financial system. Thus the solution is to offer different products and alternatives to lending money, such as microfinance, which has become increasingly popular in recent years. Also, the Mexican financial sector has a high population concentration inside large cities, but fails to reach out to excluded areas. Worthwhile initiatives to develop this sector include the use of in-store retail banks, banking correspondents and mobile phone banking. Fortunately there are already initiatives planned to achieve a greater degree of financial inclusion in 2020; these should increase the nation’s progress (Center of Financial Inclusion, 2009).

As a whole, the OECD group supports the alternative hypothesis; countries with high financial inclusion enjoy better overall development; which could be explained by the opportunities that participating in the financial sector brings to each individual and the economy overall.

6.2. THE EUROPE GROUP

The following five countries present similar characteristics to each other, their human development index in average is 0.9, which is very high. The new financial inclusion index places them all in the upper middle section, with the United Kingdom in fourth place and Italy in eleventh. These support the experimental hypothesis that financial inclusion is correlated with development.

Even though these countries have a similar financial inclusion outcome, they all reach it through different ways. For example, in the UK most Banks are nationwide, whilst French banks are a combination of nationwide and mutual organizations. Germany, although it has national banks, also has many regional banks, which have significant market share (EUFFI, 2012). This shows that more than one strategy can reach financial inclusion. Another factor that may influence European homogeneity is that foreign banks operate across different countries, like the strong presence of Santander in the UK, Deutsche Bank having branches in Poland, SEB throughout the Baltic and HSBC operating worldwide. This builds similarity across Europe, which helps explain the homogenous results (EUFFI, 2012).

Strong influence by the European Union also explains why these countries present similar results, which encourages and coordinates national governments to reform their financial systems to combat financial exclusion (J rusalmy, 2009). They jointly pursue similar policies to best expand this sector; these ideas form part of the “Joint Inclusion Memoranda” that all member countries can consult anytime (J rusalmy, 2009).

Like the OECD, the European Countries support the alternative hypothesis; that development is linked to an inclusive financial sector, and as such, developed countries tend to provide a large sector of the population access to credits and savings, among other financial services.

6.3. THE ASIA GROUP

The Asia group forms the third category, which presents the most mixed results; it hardly behaves as a whole. In terms of financial inclusion, according to this index, Singapore is the leader in the seventh place, and India lies at the bottom in eighteenth position. This group does not share any characteristic like the others, so its constituent countries will be discussed separately. Their development ranges from 0.5 and 0.9, so they are scattered across the high, medium and low-income groups.

Singapore belongs to the group of high financial inclusion and also high development. This is due to the country’s comprehensive asset-building policy (Loke, 2007). For example the Edusave Scheme that was implemented in 1993

for schoolchildren between 6 and 16, aiming to maximize their academic opportunities, whereby each child received \$4,000 in their interest-earning Edusave Accounts during the 10 years of school (Loke, 2007). Another example is the Central Provident Fund; a mandatory saving system into which every employed person contributes and also their employers. This is intended for payment of medical expenses in retirement (Loke, 2007).

Thailand is in the middle of the table with an inclusion score of 0.46. In June 2011, the Bank of Thailand allowed commercial banks to engage in microfinance, with no minimum income requirement for borrowers (Trivedi, 2011). This initiative aimed to attract more people of any salary into the banking system. Also, by involving commercial banks, they can reduce operating costs and increase competition, offering better rates to consumers (Trivedi, 2011).

Malaysia has a financial inclusion index of 0.44, occupying the twelfth place. This country appears to be progressing well, in 2009 the Central Bank implemented legislation supporting the financial inclusion agenda to ensure that future generation of central bankers will continue their efforts in building this all inclusive system (Akhtar, 2010). Some of these new policies incorporate a business environment that delivers a broader range of products and services to meet the diverse needs of the population. This project improves consumer protection, financial literacy and awareness, which aims to help people participate in the economy and make informed decisions about their own money. Furthermore to develop financial infrastructure, in July 2008 the Credit Bureau started to assist small and medium enterprises (SMEs) to track their records and to provide a balance profile of their credits to enhance financing on more favorable terms (Akhtar, 2010).

Bangladesh is one of the pioneers of financial inclusion. In 1983, Muhammad Yunus founded the Grameen Bank. For this he won the Nobel Peace prize in 2006, by developing a microfinance organization and a community development bank for the poor, and his ideas are now shared worldwide. Regardless, Bangladesh presents a low level of financial inclusion with a score of 0.22. According to the report by the Central Bank, the main barrier is access to bank branches; a large section of the population has no physical access to any banking service. Promoting technological innovations to

expand the financial sector could quickly solve this (FE Report, 2012). However there remains another structural issue, the lack of proper documentation, and inadequate financial literacy, which prevents the rural population from participation. It has been recommended that policies target low-income groups by providing loans and credits to agricultural and rural programs. Mobile banking appears to have included more people in the system, but further progress is needed (FE Report, 2012).

India displays interesting results, because it has the development of a middle-income country, but the financial inclusion of a low-income country. This is explained by the fact that 72% of the population lives in small villages where no bank branch exists. Also, people from distant communities remain unaware of financial products such as insurance. Furthermore the rural poor suffer from financial impediments, due to abnormalities in seasonal income and job-related migration. In 2005, the Reserve Bank of India launched an initiative to aid the unbanked masses, through the introduction of Regional Rural Banks. The process has proven successful but slow. In 2010, 40% of the population remained excluded, which can be attributed to poverty and illiteracy (Jeganathan, 2010).

These countries can hardly be defined as a group based on their results. These mixed results arise from the fact that these nations are struggling to catch up with the high development countries, maybe in several years, after they have settled and understood their economic needs, they will present similar results, and will support the alternative hypothesis.

6.4. THE AFRICA GROUP

Africa is the final group, which presents more unified results than the Asia category. South Africa has the highest degree in both development and financial inclusion, it is placed thirteenth in the new IFI, followed by Somalia and Nigeria, however, these are noticeably lower than South Africa in financial inclusion. Finally Uganda and Egypt lie at the bottom of the sample, lower still. However despite these differences, the distinct pattern is that all of these countries form an uninterrupted group at the bottom of the IFI, showing considerable uniformity, particularly compared to the Asia Group. Note that this

caveated by the exclusion of Mexico, Bangladesh and India, which are discussed below as anomalies.

The government of South Africa has undertaken a number of initiatives to accelerate financial inclusion in recent years. These activities include promoting entry into the banking sector, creating a framework for cooperative banks and introducing deposit insurance. Another factor that facilitates financial inclusion is that this country is largely urbanized; only one third of the population lives in rural areas, which simplifies access to banking services. However the main challenge is that 21% of the adult population has a limited access to infrastructure, and therefore limited interest or knowledge to participate on the financial sector (Khumalo, 2012). Also, 67% of South Africans do not save, but 58% claim that it is important to have money available in case of an emergency, which shows that a large part of the population understands the need to be included but are not actively doing so. South Africa has a mixed population; it is important to provide financial services to all consumers and to balance this complex interplay of low incomes to meet their needs alongside those of the middle and upper classes. The government of South Africa is working hard to solve this puzzle, in which they must understand how their country can register a higher development level (Khumalo, 2012).

Nigeria presents a low degree of financial inclusion, which means that significant work remains to the meet the 2020 UN objectives. The Central Bank of Nigeria has developed an Exposure-Draft on the Financial Inclusion for Nigeria. It aims to reduce the percentage of adults excluded from 46.3% in 2010 to 20% in the next ten years (Central Bank of Nigeria, 2012). This process document has not been finished at present, but associated literature assures that the measures suggested therein will enable a large sector of the population to access financial services, engage in economic activities, and contribute to the overall development of Nigeria (Central Bank of Nigeria, 2012).

Uganda has the nineteenth position in this index, showing a particularly low degree of financial inclusion. 62% of the population is unbanked, representing over 32 million people (Juuko, 2011). Therefore to solve Uganda's challenges in financial inclusion structural reforms are needed. The only way to achieve this expediently is for the Government, Central Bank and commercial

banks to collaboratively define and implement a means of reaching a wider population. A higher level of financial inclusion will have a direct impact on sustainability and poverty reduction efforts. A scheme of financial literacy is fundamental to include as many people as possible (Juuko, 2011). The government should also offer incentives that compel individuals to save; this will increase the demand for bank branches in secluded areas. Uganda is struggling with severe financial exclusion; thankfully the government is taking measures to reduce this gap, and hopefully by 2020 the results will show some improvement (Juuko, 2011).

Egypt has the lowest financial inclusion index from these twenty countries. The war in recent years explains limited participation in the banking sector. This type of continuous battle increases poverty, excluding a larger part of the population. On November 2011, the Princess of Netherlands (who is also the United Nations Secretary General's Special Advocate for Inclusive Finance Development) visited Cairo to raise awareness and promote financial inclusion (Abdoun, 2011). She wisely noted that financial services are the means to an end rather than an end themselves, to make a difference in the quality of live for the Egyptians. This country offers some microfinance services, but these are outdated and insufficient to cover half of the population, so a first step could be to modernize them.

Clearly Egypt has considerable work outstanding, sadly for as long as the war lasts, resources and focus will be directed towards solving this issue and only after that addressing the high degree of financial exclusion (Abdoun, 2011).

The African countries in general have a low development level, and the information from the new financial inclusion index coincides with this data. It is necessary for them to start putting into action the financial inclusion policies if they want to meet the Millennium Development Goals for 2020. These countries support the alternative hypothesis.

6.5. EXCEPTION COUNTRIES

The main objective of this index is to determine if there is a relation between the New Financial Inclusion Index and the Human Development index.

Given the data from the table above, the correlation coefficient is $r = 0.86$. This shows that the degree of financial inclusion is strongly correlated to development in each country. This coefficient was affected by the exceptions in the index such as Mexico, India and Bangladesh, which present low financial inclusion compared to their development levels. Three reasons explain this, each discussed below. Firstly, the informal economy, in which people actively participate in the economy, however are discouraged from strict adherence to the law and formal economic institution, due to high levels of bureaucracy and widespread black markets. Another reason is that since these countries are in the process of developing, so is their financial sector, and this index was measured at an inflexion point; maybe in 2013 these countries will fare better because their planned policies will be implemented and delivering results. Finally the third reason is that because the New Financial Inclusion index works with many variables in order to present a complete view, maybe some of these data were not measured properly and when the World Bank published the data, mistakes already existed in the source data. Regardless of these reasons, a $r = 0.86$ correlation coefficient is sufficiently high to assure that a positive correlation exists between the financial inclusion and development.

6.6. FURTHER RESEARCH

The new financial inclusion index shows a positive correlation with the human development index, suggesting that the new IFI is strong and can be used in other academic research. Computing it for all countries and analyzing the results could improve this index.

Also, the new IFI is intended to capture all the available information that is provided by the World Bank through the Global Findex, but if a better data source becomes available, it is worth using this with the SANDY method for financial inclusion and comparing the results.

For future use the new IFI should be updated based on the new information available, as it is probable (for example) that during the next year the mobile banking will increase in popularity, so the weights in the index may need to be recalculated for this.

7. CONCLUSION

This study has shown a strong, positive relationship between financial inclusion and development. The new IFI captured all available financial data for the twenty analyzed countries and offers a holistic measure of financial inclusion across these nations. In future it is worth computing this index for all countries and with updated information.

Financial inclusion appears to be essential to reach higher development. It provides fertile ground for citizens to build their lives, giving them access to saving bases, credit schemes and insurance. Further research could now use a regression analysis to investigate how the benefits of financial inclusion specifically drive higher development, both at an individual level, and also for the wider economy, as this appears a logical assumption based on results presented above.

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