Short Bio

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Microfinance, Financial Inclusion and Financial Development: An Empirical Investigation with an International Perspective

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Abstract. A dynamic chain of activities can be observed in the international economy which would require an efficient and effective financial sector capable of integrating a flexible system of monitoring the flow of financial resources from debtors to creditors. But is this happening? Are all industries financially linked? The fundamental question that this research aims to answer is: how does microfinance promote financial inclusion and financial development? The answer shall be achieved through the following objectives: to illustrate the link or relationship between microfinance and financial inclusion; to show empirically how microfinance influences financial inclusion; and lastly to identify the influence and relationship of microfinance access and financial inclusion to financial development. The conjectures of the study shall be tested from a set of international data on the microfinance industry and the findings verified for the Philippine case. Four points can be inferred. First, microfinance outreach has a significant relationship to financial inclusion. Second, financial inclusion has a significant positive relationship to financial development. Third, other indicators such as capital access, capital depth, size and gross domestic product contribute to an improvement in financial development. Lastly, total loans outstanding, number of active borrowers and portfolio at risk likewise positively and significantly affect financial development in the Philippines. Group lending mitigates the high level of risk inherent among micro-borrowers, making microfinance institutions capable of contributing to a country's financial development.

Keywords: Microfinance industry, financial development, financial inclusion, knowledge economy

As information and knowledge add value to basic products manufacturing and services are becoming increasingly integrated into complex chains of creation, production and distribution among firms of various asset sizes. At the core of the economy are goods producing industries, linked into value chains which see inputs coming from knowledge-based business services and goods related construction and energy industries, and outputs going to goods related distribution service industries.

Market failures involving the lack of efficiency in the distribution of financial resources may only be a temporary phenomenon in a situation when various micro-industries are entering into the competitive world market. By enabling micro-industries

to have access to financial services, the microfinance industry has been seen as one of the tools to combat financial exclusion – a poverty trap – and conversely promote financial inclusion. Financial exclusion results when firms do not have the following: bank account, savings, assets, access to money advice, insurance and access to credit.

Microfinance's ability as a tool for poverty alleviation has gained much praise and as such microfinance has been employed in most countries both developing and developed alike. The recognition gained by Muhammad Yunus, one of the proponents of microfinance, has all the more put microfinance in the limelight.

1. Background of the Study

Microfinance is often seen as a poverty alleviating tool, specifically, to smoothen the consumption stream of low income households. Apart from the credit that microfinance provides for the poor, it also gives them access to other financial services such as savings, financial education and insurance, among others. The access to the other financial services is what actually makes it microfinance. Through the other financial services it provides, microfinance has enabled the poor to climb up the financial ladder. As such, microfinance has been likewise seen as one of the tools to combat financial exclusion – seen as a poverty cause that traps the poor – and conversely promote financial inclusion.

Fortunately though, the innovations in microfinance has allowed it to be not merely a lending facility for the poor but a means by which they can also experience and take part in activities banks and other financial institutions deprive them of. Microfinance, through its other financial services like savings and insurance, has enabled the poor to be financially included into the financial system. As such, this study will look into the relationship, effects and impact of microfinance on financial inclusion by looking at cross country data on microfinance performance assessment variables.

With results gathered from the relationship of microfinance to financial inclusion, how microfinance affects and promotes financial development will also be considered. The broader impact of microfinance activity in the integration and development of the financial system will be assessed.

1.1 Statement of the Problem

Although microfinance is also often seen as a tool to improve financial markets, there seems to be a lack in studies relating microfinance to financial development. As such, the fundamental question that this study aims to answer is *how does microfinance promote financial inclusion and financial development*?

This study will try to determine if there exists a relationship between microfinance and financial inclusion, as well as microfinance and financial development. Through a study of microfinance variables and indices signifying financial inclusion and

development, the relationship (or lack thereof) of microfinance and financial development will be established.

1.2 Significance of the Study

For any developing economy, it is necessary to assess the integration of all sectors for growth and development. In most developing countries, the problem is seen in the divide of the real and financial sectors. In some developing countries, there is even a divide in the financial sector alone. Development of financial system has been negligent of the informal financial intermediaries present in the market. With this, the need to be more inclusive –by including the informal systems of which the low income households form part of – arises. There is a need to be more integrated to be able to further development. For most economies, financial development can be achieved through the promotion of financial inclusion, which in turn can be possibly achieved through microfinance.

Financial inclusion is important in building economies. A more inclusive financial system is said to be beneficial because of the number of good effects it has both on the microeconomic and macroeconomic levels. Conroy (2006) argues that financial inclusion brings about economic efficiency and distributional equity as it extends deposit services to a larger number of people and enables fruits of economic development to be shared by everyone, respectively. Microfinance has likewise been proven to have a number of good effects to both. Many attempts have been made to actually quantify and empirically prove these positive impacts of microfinance in both the microeconomic and macroeconomic as well as in society and the economy, with the poverty alleviation being the most studied impact.

1.3 Objectives of the Study

To answer the problem pointed out, this thesis should attain the following objectives: (1) To illustrate the link or relationship between microfinance and financial inclusion; (2) To show empirically how microfinance influences financial inclusion; and lastly, (3) To identify the influence and relationship of microfinance access and financial inclusion to financial development, with application to the Philippines.

1.4 Scope and Delimitations

The study will determine and explain the relationship between microfinance and financial inclusion through a study of the microfinance assessment variables. Financial inclusion is defined as the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost. It will likewise try to establish the link between financial development, financial inclusion and microfinance and are not meant to be used as forecasting models. The causality that the study aims to establish is from (1) microfinance to financial development and, (2) financial inclusion to financial development and economic growth.

The study will be a cross country analysis incorporating international data. Limited to the number of countries with available indices of financial inclusion developed by Sarma (2008) and financial development developed by the World Bank (2007), a total of thirty eight countries were considered in the sample, including Argentina, Armenia, Bangladesh, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Chile, Colombia, Dominican Republic, Ecuador, Egypt, Guatemala, Honduras, Hungary, India, Indonesia, Jordan, Kazakhstan, Kenya, Madagascar, Mexico, Nicaragua, Nigeria, Pakistan, Panama, Peru, Philippines, Romania, South Africa, Thailand, Trinidad and Tobago, Turkey, Uganda, Venezuela and Zimbabwe. The countries included in the study were chosen primarily because of data availability. Macroeconomic data of the countries aforementioned were obtained from the World Bank Database.

Microfinance will be taken in this paper as the provision of financial services to the lower income households given by microfinance institutions which may take on the form of NGOs, non bank financial institutions, credit cooperatives and rural banks. Only microfinance institutions registered in the Microfinance Information Exchange (MIX) Market were included in the study. As data was dependent on what was available in MIX, microfinance indicators included in the study are total assets, gross loan portfolio, number of active borrowers and savers, and portfolio at risk. With these data, the study will be limited as to being able measure the inherent risk in microfinance only in terms of Portfolio at Risk (PAR). The study will not provide new indices but will only work on existing data and indices to test carry out its objective and answer the problem. It will follow the definition of financial inclusion, financial development and microfinance presented in the succeeding portion.

2. Review of Related Literature

This chapter presents the concepts and ideas of different authors that were considered.

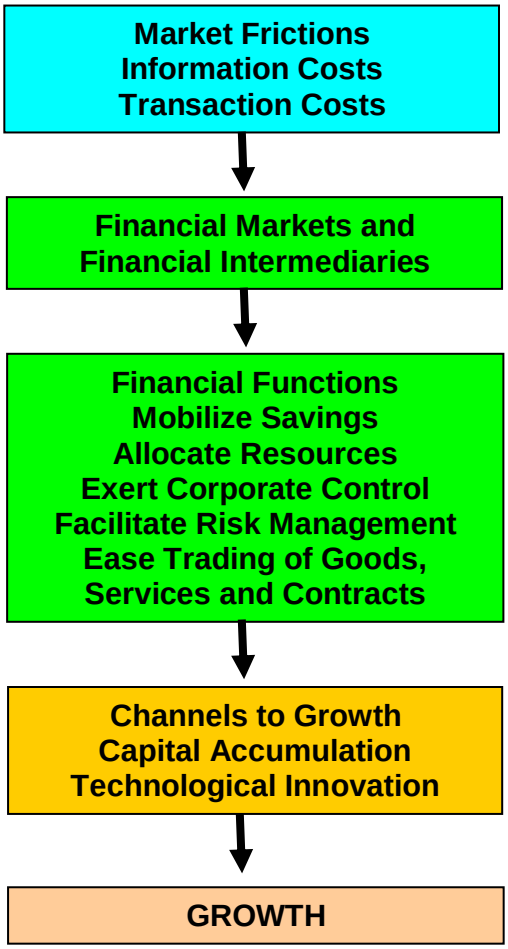
2.1 Financial Development and Growth

Financial development is said to affect economic growth as financial systems try to ameliorate the information and transaction costs present in an economy. Given this, what has been defined as the primary function of financial systems is to facilitate allocation of resources across space and time, in uncertain environments. Generally this primary function of financial systems can include a vast range of other functions. Levine (1997), however, breaks the primary function into five main basic functions, namely: (1) facilitation trading, hedging, diversifying and pooling of risk; (2) allocation of resources; (3) monitoring managers and exert corporate control; (4) mobilization of savings; and (5) facilitation exchange of goods and services.

The relationship between the development of financial systems is provided by the framework crafted by Levine (1997) presented below. Levine's theoretical framework to explain the link between finance and growth takes off from development theory, i.e. the

role of redistributing resources. The redistribution of resources provide room for accelerated growth, enabled by financial institutions and intermediaries, through the functions these institutions hold.

Figure 1. Levine's Theoretical Approach to Finance and Growth

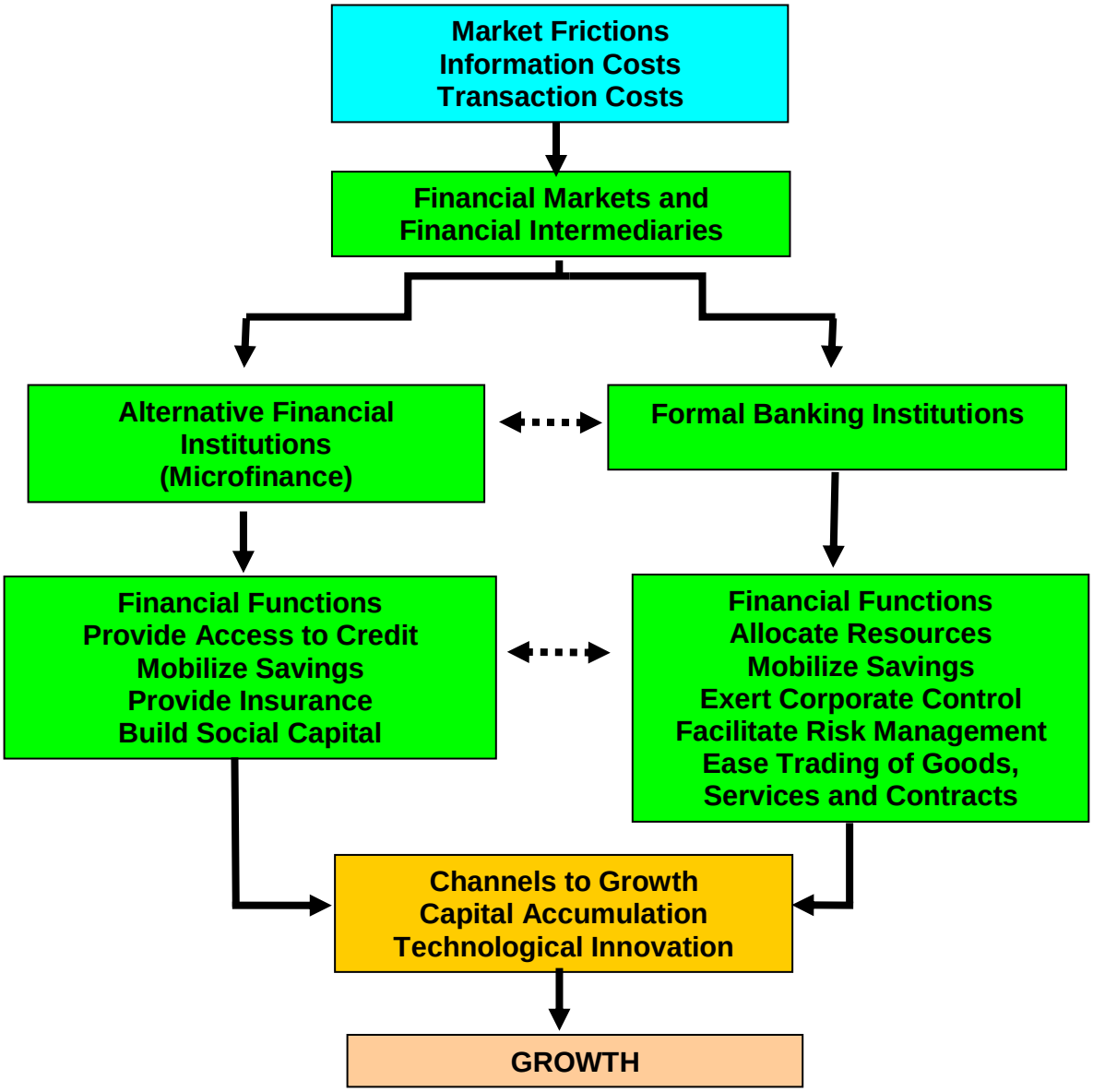


New growth theories posit that finance can influence growth in a number of ways, (1) by increasing efficiency in the intermediation process; (2) increasing productivity of capital; and (3) increasing savings rate. Better savings lead to better capital accumulation, which in turn improves resource allocation and boosts innovation and growth. Previous studies on the link of financial development and growth as well as theories on growth and development, however, only consider formal financial institutions as catalysts to growth. Information financial institutions, usually represented by low-income households, may not be incorporated into the financial system (Sarma 2008, Padhi 2003).

With the existence of the less formal financial intermediaries – among which is microfinance – a divide in the financial market results. These informal financial institutions may also be catalysts to financial development and growth. Adopting the

framework developed by Levine (1997) and Sarma (2008), Padhi (2003) incorporating the present conditions of the financial market, this paper will make use of the following conceptual framework:

Figure 2. Incorporating the Divide between Financial Institutions



Source: Levine (1997), Sarma (2008) and Padhi (2003)

2.2 Financial Development through Microfinance

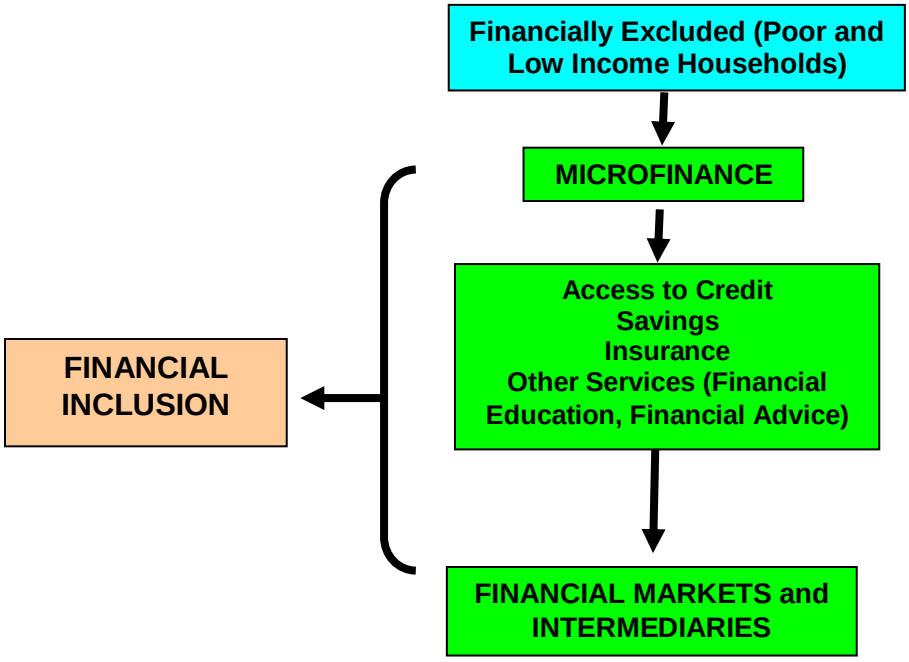
As a financial intermediary, microfinance is seen to perform two of the functions Levine (1997) has identified – mobilize savings and allocate resources. One of the measures of financial inclusion (and development) is savings. Through savings, the poor are able to assimilate themselves in the financial system. As such initiatives to

increase access to savings have been pushed for. This consequently furthers financial inclusion. But a question that seems to arise from this too is whether savings is the only factor that can better financial inclusion. Is it the only way by which microfinance can help better financial inclusion?

Poor households are perceived as dissavers. Murdoch and de Aghion (2005) argue that the poor have no savings because the desire to borrow (to consume) is greater than the desire to save. Though this may be the case, recent studies show that the poor actually have a high marginal propensity to save. The fact that microfinance is inherently risky cannot be discounted. Because of the target clientele, there exists a risk of borrower payment default. It is, however, observed that microfinance institutions have had good repayment rates in the past few years because of the structure of microfinance itself. With the employment of group lending that highly imposes personal collection effort as well as social pressure as collateral loan portfolio risk is minimized.

The diagram, Figure 3, suggests how microfinance is seen as the poor and low income households' link or bridge towards financial inclusion. Through the financial services provided by microfinance such as savings, access to credit and insurance, more people become included in the financial system – both by definition and in actuality.

Figure 3. Analytical Framework to Microfinance and Financial Inclusion



Source: Authors' own

2.3 Financial Inclusion

Finance influences not only the efficiency of resource allocation throughout the economy but also the comparative economic opportunities of individuals from relatively rich or poor households. Financial institutions exist to serve as intermediaries in a market with high information asymmetries and transaction and information costs. As the bridges between the firms and the households, financial institutions live up to the primary function of being able to spur growth and development. Though this may be the case, there exists a divide within the financial system in itself. As it is at present, a considerable number of people are excluded in the financial system. Financially excluded, as they are defined to be, there is a seen need for them to be included in the financial sector.

India has pushed for efforts in tackling the issue of financial inclusion. In India alone, a considerable number of studies have been made to further financial inclusion. Financial inclusion, as defined by Rangarajan Committee on Financial Inclusion in India is “the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost.” Though much has been written on financial inclusion, a gap in the literature is seen as no comprehensive measure is available to determine the level on financial inclusion in countries. As such, Sarma (2008) proposes an index which can answer the empirical questions as regards financial inclusion ad development.

The World Bank usually measures the level of financial inclusion through certain banking measures. These include number of bank branches, number of accounts, and domestic credit as percentage of GDP and domestic deposit as percentage of GDP. These indicators for financial inclusion however, as Sarma (2008) argues, are not enough because it only identifies one dimension of banking outreach.

The index of financial inclusion is among the most significant variables used in this study. As such it is necessary to give exposition as to what the index is and what the index represents more than just being an measure of the level of how financially inclusive financial systems are. The concept behind and the derivation of the index of financial inclusion are provided in the succeeding portion.

As an initiative of the Indian Council for Research on Economic Relations, Sarma (2008) proposed a measure by which the level of financial inclusion can be measured. Following from the framework of other UNDP indicators such as the human development index (HDI), gender related development index (GDI) and other indices, the index of financial inclusion (IFI) was derived. A dimension index for each included dimension of the IFI was first derived. The dimension index for the i^{th} dimension is given by the formula:

$$d_i = \frac{A_{ii} - m_i}{M_i - m_i} \quad (1)$$

where,
A_i = Actual value of dimension $_i$
m = minimum value of dimension $_i$
M = maximum value of dimension $_i$

After getting the dimensions, the formula for the index of financial inclusion was derived to be a weighted average of the dimension indexes. As such, it can be presented as follows:

$$IFI_i = 1 - \sqrt{(1-d_1)^2 + (1-d_2)^2 + ... + (1-d_n)^2} \Big/ \sqrt{n} \quad (2)$$

The three dimensions included in Sarma's (2008) define the three most used determinants of financial inclusion in previous studies conducted by the World Bank. These are banking penetration, availability of banking services and usage measured in terms of number of people with bank accounts, number bank branches and credit and deposits as percentage of GDP, respectively.

Due to unavailable data, Sarma (2008) was limited to coming up with an index for only a few countries and an index of financial inclusion based on only two dimensions. The index is only based on usage and availability. The computed indices of the countries included in this study are presented in the table below. (See Table 1)

Table 1. Index of Financial Inclusion					
Number	**Country**	**Index of Financial Inclusion**	**Number**	**Country**	**Index of Financial Inclusion**
1	Jordan	0.352	20	Bangladesh	0.12
2	Panama	0.313	21	Honduras	0.12
3	Thailand	0.303	22	Pakistan	0.12
4	China	0.297	23	Ecuador	0.113
5	Hungary	0.274	24	Colombia	0.104
6	Chile	0.222	25	Nicaragua	0.102
7	Kenya	0.218	26	Argentina	0.09
8	Egypt	0.216	27	Mexico	0.089
9	South Africa	0.209	29	Albania	0.084
10	Brazil	0.208	30	Dominican Republic	0.084
11	Bulgaria	0.176	31	Romania	0.08
12	India	0.17	32	Peru	0.067
13	Philippines	0.163	33	Kazakhstan	0.064
14	Guatemala	0.147	34	Venezuela	0.05
15	Trinidad and Tobago	0.144	35	Nigeria	0.048
16	Indonesia	0.141	36	Armenia	0.042
17	Turkey	0.137	37	Madagascar	0.023
18	Bolivia	0.129	38	Uganda	0.016
19	Bosnia and Herzegovina	0.129			
Source: Sarma, Madira. (2008). Index of Financial Inclusion					

3. Empirical Methodology: Measuring the Contribution of the Microfinance Industry to Economic Development

There is no established direction of causality nor theoretical explanation as regards the necessary and sufficient conditions which would link risk, liquidity, solvency and sustainability among microfinance institutions and the commercial financial sector. Thus, the study would have to use an empirical methodology which would provide an empirically good fit for the dependent and explanatory variables while at the same time establish a result that would be applicable to a wide variety of cases, i.e. provide a robust result.

The use of indexed variables provides the study with full information dependent variables, and avoids the endogeneity problems inherent in variables, i.e. where no established directions of causality nor of necessary and sufficient conditions have been done. The use of indexed variables also provides data which have approximately normal distributions and thus estimation procedures such as censored count and generalized least squares models, can be employed to explain the relationships among the various variables. The disadvantage of indexed variables, though, is that data points

may be correlated. Thus, the estimation procedure will also have to handle corrections for high correlations across heteroskedastic samples. This can be resolved with the use of a pooled regression, which establishes iteratively the best possible linear fit for the sample.

The variables used in the study are dependent on the conceptual map or framework presented in Figure 3. A similar procedure was used by Pindado and Rodrigues (2004) to explain the financial insolvency of small businesses in Portugal.

It is essential, however, to have an information criterion for the parsimonious model used. The resulting regressions would have the following characteristics:

(a) it is important to have a good empirical fit for the dependent variable as the resulting regression across several countries shall be applied to the Philippines, making use of variables relevant to the Philippine microfinance industry;

(b) establish the information criteria from the results of the maximum likelihood censored count regression estimation procedure. The criterion is to choose the equation which achieves the least log likelihood function and therefore the least Akaike Information Criteria measurement (AIC).

The basic data used for the estimation procedures are shown in Table 2.

Table 2. Variables used in the Study						
Economy	**Total Assets**	**Gross Loan Portfolio**	**Savings**	**Number of Active Borrowers**	**Number of Savers**	**Portfolio at Risk**
Albania	60,709,745	49,936,838	NA	21,665	433	5.10%
Argentina	2,762,592	1,901,487	NA	6,595	65	5.36%
Armenia	12,068,159	15,288,315	NA	19,337	NA	3.70%
Bangladesh	1,220,175,04	895,229,233	187,283,500	12,948,250	9,299,56	4.80%
Bolivia	587,397,627	156,325,927	248,266,942	346,930	271,277	8.35%
Bosnia and	174,848,039	157,494,725	NA	116,925	NA	0.75%
Brazil	111,160,405	99,756,505	9,651,702	203,264	25,208	1.65%
Bulgaria	919,264,156	499,861,635	880,455,217	3,271,128	3,896,18	2.27%
Chile	255,927,065	242,284,763	105,077,053	196,691	105,525	4.93%
China	2,817,269	2,266,068	NA	30,315	NA	3.66%
Colombia	196,448,762	174,960,666	18,331,615	333,548	2,301	4.43%
Dominican Republic	117,434,905	87,131,913	40,073,830	78,340	30,251	4.81%
Ecuador	467,554,638	360,328,521	238,211,148	217,947	261,506	4.54%
Egypt	72,949,197	26,939,538	-	143,357	-	2.73%
Guatemala	84,424,257	55,475,125	-	87,241	-	9.41%
Honduras	42,391,877	34,187,377	2,997,646	99,601	4,516	8.24%
Hungary	1,520,157	1,274,890	-	60	-	0.00%
India	270,723,998	232,724,407	6,145,282	2,042,903	29,372	2.69%
Indonesia	4,204,277,48	2,068,952,59	3,524,094,09	3,277,571	31,362,0	8.72%
Jordan	73,250,511	49,046,694	-	33,709	-	3.60%
Kazakhstan	22,329,069	15,722,759	-	18,195	-	2.56%
Kenya	177,851,338	101,222,801	72,043,763	244,727	438,974	5.97%
Madagascar	23,112,101	13,698,055	8,147,412	52,955	139,217	8.08%
Mexico	994,838,000	743,186,381	738,036,577	914,547	1,258,93	2.20%
Nicaragua	226,267,118	180,853,607	31,460,243	283,709	39,035	5.97%
Nigeria	4,308,030	2,847,040	736,504	51,073	8,564	22.67%
Pakistan	113,731,371	38,116,229	6,120,662	266,486	79,572	1.84%
Panama	17,396,635	10,599,584	-	10,104	-	6.60%
Peru	1,600,131,17	1,251,777,95	678,167,565	1,280,307	971,903	4.79%
Philippines	114,760,282	78,305,109	22,032,966	816,068	317,480	7.34%
Romania	27,865,304	22,610,424	-	6,620	-	3.17%
South Africa	510,941,538	87,602,191	268,188,774	278,650	-	18.25%
Thailand	89,395,858	79,674,514	42,935,388	50,662	12,125	0.00%
Trinidad and Tobago	743,972	671,633	-	4,298	-	3.61%
Turkey	337,201	2,585,440	-	1,780	-	3.61%
Uganda	641,547	420,911	-	1,058	-	5.81%
Venezuela	155,452,404	80,150,959	88,607,138	213,599	653,768	0.00%
Zimbabwe	1,362,272	504,568	-	10,252	-	38.96%
Source: Microfinance Information Exchange Portal (MIX) (http://www.mixmarket.org)						

4. Results: Answering the Objectives through the Hypothesis

A link between the objectives, hypotheses and results follow.

First Hypothesis: Microfinance has a positive significant relationship to the index of financial inclusion.

To answer the first objective, the index of financial inclusion will be taken as a function of the microfinance variables stated above. As such, it will be represented by the function:

Index of Financial Inclusion (IFI) = Total Assets (TA) + Gross Loan Portfolio divided by the Number of Active Borrowers (GLP/AB) + Savings (SAV) + Number of Savers (SAVR) + Number of Active Borrowers (AB) + Portfolio at Risk (PAR)

The results show that microfinance outreach has a significant relationship to financial inclusion. The significance of the microfinance variables to the index of financial inclusion shows how much microfinance is able to incorporate itself into the formal sector. The negative coefficient for the number of active borrowers manifests and portfolio at risk indicates a greater presence of financial risks with increasing borrowers and creditors along with a large amount of unpaid loans. The resulting estimation on the financial inclusion index in Table 3 shall be used to explain the financial development index for objective 2.

Table 3. Regression Result for Financial Inclusion

Dependent Variable: Index of Financial Inclusion Method: Generalized Least Squares Number of observations: 20				
Explanatory Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.224	0.023	9.764	0.000
Solvency	0.009	0.003	3.526	0.003
Number of Active Borrowers	-3.99E-08	2.78E-08	-1.434	0.172
Number of Savers	2.83E-09	2.49E-09	1.354	0.274
Portfolio at Risk	-0.416	0.289	-1.441	0.170
Weighted Statistics				
R-squared	0.979	Mean dependent variable		0.393
Adjusted R-squared	0.974	S.D. dependent variable		0.520
S.E. of regression	0.084	Sum squared residuals		0.106
F-statistic	177.783	Prob(F-statistic)		0.00

Second Hypothesis: Microfinance and financial inclusion is positively related to financial development.

The second empirical objective of the study is to show the relationships of microfinance and the index of financial inclusion with financial development. The results for the second and third objectives shall be summarized in Table 5.

To assess whether microfinance indeed has an impact on financial development, the (1) index of financial inclusion and the (2) microfinance variables will be tested over

the financial development index developed by the World Bank. The correlation will be tested to determine the influence of the microfinance outreach to the level of financial development.

As the microfinance variables are expected to have an impact on the index of financial inclusion, it would suggest that microfinance helps in furthering the integration of the financial system. This would also suggest that microfinance, though an informal financial intermediary, is something that may also affect financial development. The function may be represented as:

Financial Development (FINDEV) = IFI + TA – GLP/AB + SAV/SAVR + AB – PAR

Then, the relationship of microfinance access and financial inclusion to financial development, as proxied by the Gross Domestic Product (GDP), shall be done.

Third Hypothesis: Microfinance, financial inclusion and financial development are all positively related to GDP.

Given that, the dependent variables tested in the previous regressions will likewise be tested on the GDP per capita, taking on the function of

GDP per capita (CAPITA) = IFI + TA + GLP/AB + SAV/SAVR + AB + PAR

The other indicators (represented by Y) to be included in the study include capital access and availability (CA), capital size (SIZ), capital depth (DEP), global competitiveness index (GCR) and the level of financial market sophistication (FMS). As a validation of the results generated from the previous regressions (this one particularly on the results of regressions on GDP), it is likewise expected that these regressions result to show significant positive relationship between the microfinance variables and index of financial inclusion to the dependent variables. The results will be applied to the Philippines.

Generally, the study aims to show and establish that there is a significant positive relationship between and among the variables included in the study. The matrix (See Table 4) below summarizes the empirical methodology used to answer the different objectives:

Table 4. Summary of Objectives and Empirical Methodology			
	Objective 1	**Objective 2**	**Objective 3**
Empirical Method	Link between micro-finance and financial inclusion	Empirically show that financial inclusion promotes financial development	Identify the influence and relationship of microfinance access and financial inclusion to economic growth and apply in the case of the Philippines
Type of Regression	Least squares, censored count, generalized least squares regressions all using a parsimonious functional model, and testing the significance (or redundancy) of chosen variables using the appropriate coefficient test and information criteria		
Regression Function	IFI = f {total assets, total loans outstanding, savings number of active borrowers, portfolio at risk }. This estimated variable shall used in objective 2.	FINDEV = f {index of financial inclusion, index of financial inclusion, total assets, total loans outstanding, savings, number of active borrowers, portfolio at risk}	GDP = f{index of financial inclusion, index of financial inclusion, total assets, total loans outstanding, savings, number of active borrowers, portfolio at risk}
Dependent Variable	Index of Financial Inclusion and Financial Development Index		$GDP_{per\ capita}$
Explanatory Variables	Index of financial inclusion, number of active borrowers, total assets, total loans outstanding/loan portfolio, savings, portfolio at risk		
Expected Results from the Hypotheses	All variables expected to have a positive relationship with the index of financial inclusion, financial development and economic growth; a high degree of correlation among microfinance variables is likewise expected to result from the regressions. Presence of information asymmetries may influence a negative coefficient for number of active borrowers and portfolio at risk.		

Table 5. Summary of Results										
Dependent Variables	**Independent or Explanatory Variables**									
	Index of Financial Inclusion (Estimated)		**Solvency**		**Number of Active Borrowers**		**Number of Savers**		**Portfolio at Risk**	
	CC	**GLS**	**CC**	**GLS**	**CC**	**GLS**	**CC**	**GLS**	**CC**	**GLS**
Index of Financial Inclusion			**s**	**ss**	**[-] ss**	**[-] s**	**ss**	**ms**	**ss**	**[-] ms**
Financial Development Index	**ss**	**ss**	**ms**	**ms**	**ss**	**ss**	**[-] ss**	**[-] ss**	**ss**	
Capital Access	**ss**	**ss**	**[-] s**	**[-] ss**	**ss**	**ss**	**[-] ss**	**[-] ss**	**ss**	**ss**
Size (number of members)	**ss**	**ss**	**[-] ss**		**ss**	**ss**	**[-] ss**	**[-] ss**	**ss**	**ss**
Capital Depth	**ss**	**[-] s**	**ss**	**ss**	**ss**	**ss**	**ss**	**ss**	**s**	**ms**
GDP per Capita		**ms**	**ss**	**ss**	**ss**	**ss**	**[-] ss**	**[-] ms**	**ss**	**[-] ss**
Global Competitiveness	**ss**		**ss**	**ss**		**ms**	**ss**	**ss**		
Financial Market Sophistication	**ss**	**[-] s**			**ss**	**ss**	**[-] s**			

Notes:

1. CC refers to regression results based on a censored count regression using extreme value distributed residuals, and, GKS refers to generalized least squares
2. Solvency is computed as Gross Loan Portfolio over Total Assets
3. All explanatory variables are expected to have a positive relationship with the dependent variables, except portfolio at risk. Cells with [-] refer to negative coefficients
4. p-values are: ss less than or equal to 5% error; s greater than 5% to less than 10% error; ms greater than 10% but less than 15% error

The positive relationship of financial inclusion to financial development is validated by the tests made on other financial development indicators such as the GDP, capital access and availability, capital size and capital depth, global competitiveness index and financial market sophistication. Similar to the results generated for the financial development index, the index of financial inclusion was in most significant cases proven to have a positive relationship to financial development. The same goes with the number of active borrowers in microfinance as well as the portfolio at risk of microfinance. From Table 5, however, we can also observe that the estimated index for financial inclusion of the microfinance industry only has a moderately significantly relationship with the financial development index and gross domestic product, both of which are indicators of the inclusion of micro-businesses to economic growth.

The special case of the Philippines presented in the study likewise supports the link established between microfinance and financial development. The regression results show that a high level of financial solvency, depicted by the gross loan portfolio as a percentage of total assets, the percentage of loans to savings which indicates the capacity of borrowers to generate income and savings from loans, level of portfolio at risk and the average amount of savings per borrower all combine to improve the level of total assets generated by the microfinance industry. Financial solvency, on the other hand, is achieved by a low level of portfolio at risk and an increase in the number of savers and active borrowers. The combination of these variables together manifests that the more successful microfinance institutions are more capable of screening and monitoring their clients and their portfolio in order to improve the level of savings and generate income from loans incurred by their members, a result similar to the international data. (See Tables 6 and 7)

Table 6. Regression on Total Assets/Active Borrowers for the Microfinance Industry of the Philippines

Dependent Variable: Total Assets/Active Borrowers Method: Generalized Least Squares Total observations: 41				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	129.520	1.812	71.488	0.00
Portfolio at Risk	0.460	0.055	8.429	0.00
Number of Savers	2.63E-05	2.69E-05	0.976	0.336
Savers/Gross Loan Portfolio	13.10272	1.055	12.420	0.00
Solvency	-185.22	3.244	-57.090	0.00
Gross Loan Portfolio/Active Borrowers	1.399	0.008	166.437	0.00
Weighted Statistics				
R-squared	0.999	Mean dependent variable		1336.968
Adjusted R-squared	0.999	S.D. dependent var		2473.596
S.E. of regression	17.471	Sum squared resid		10683.79
F-statistic	160350.9	Prob(F-statistic)		0.00

Table 7. Regression on Solvency for the Microfinance Industry of the Philippines

Dependent Variable: Solvency (Gross Loan Portfolio/Total Assets) Method: Generalized Least Squares Total observations: 41				
Explanatory Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.695	0.008	85.053	0.00
Portfolio at Risk	0.0001	0.0005	0.194	0.848
Number of Savers	1.51E-07	7.45E-08	2.020	0.051
Savings/Total Loan Portfolio	0.0154	0.009	1.778	0.084
Total Assets/Total Borrowers	-0.003	0.0002	-17.500	0.00
Gross Loan Portfolio/Active Borrowers	0.005	0.0003	16.337	0.00
Weighted Statistics				
R-squared	0.999	Mean dependent variable		4.979
Adjusted R-squared	0.999	S.D. dependent var		19.838
S.E. of regression	0.068	Sum squared resid		0.161
F-statistic	686079.1	Prob(F-statistic)		0.00

Similarly, the combination of the percentage of loans to savings which indicates the capacity of borrowers to generate income and savings from loans, level of portfolio at risk and the average amount of savings per borrower and the average total assets all together show how microfinance is able to affect financial development. These variables, as able to improve the level of solvency of microfinance institutions enable microfinance to contribute to financial development. With high levels of solvency, microfinance institutions are able to provide loans to more people and thus spur entrepreneurship and financial development. In their role to mediate the risks involved in lending to small borrowers by improving their solvency and liquidity, the microfinance industry provides the missing persisting in the financial system.

The portfolio at risk indicator captures the inherently risky nature of the business and the industry, and, thus captures the ability of microfinance to effect financial development. The indicator used in the study, however, does not incorporate the drop out ratio in microfinance.

The evaluation of the financial system is still highly dependent on the formal banking sector criterion. As such the incorporation of microfinance, which has very limited assets compared to the formal financial institutions, would be difficult. Formal evaluation of the commercial banking sector, however, incorporated with the specific characteristics of microfinance such as high risk, joint liability, group lending and minimum assets show a positive relationship to financial development. Microfinance is similarly able to positively affect financial development through savings generated from microfinance activity.

5. Conclusion

With the microfinance industry being very small in terms of value added to the whole financial sector, these variables are not able to explain Schumpeterian growth, i.e. big businesses paving the way to small entrepreneurs. The index of financial inclusion being weak in explaining the inclusion of microfinance in the formal financial system also has a weak link with the gross domestic product.

While the results of the study seem favourable and in congruence with theory, a bigger sample size may generate more robust results. It may be good to look into country level data to verify the cross-section results. Further articulation and empirical verification of the index of financial inclusion would enable countries to assess the depth of their financial sector.

Bibliography

APEC Business Advisory Council. (2008). “Commercially sustainable microfinance: A strategy promoting financial inclusion in the APEC”. January 2008

Conroy, John. (2006). “Successful Microfinance in the Pacific: Achieving Financial Inclusion”. *Pacific Islands Secretariat, UNDP Sub-regional Sector, June 2006.*

de Aghion, Beatriz and Murdoch, Jonathan. (2005). *The Economics of Microfinance.* Cambridge: Massachusetts Institute of Technology.

Levine, Ross. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature* 35: 688-726.

Morduch, Jonathan. (1999). “The Microfinance Promise”. *Journal of Economic Literature.* 37(4), 1999, pp 1569-1614.

Padhi, Bibhudutt. (2003). “Mainstreaming Microfinance: Bridging NGO-Banker Divide”. *Economic and Political Weekly*, Vol. 38, No. 46 (Nov. 15-21, 2003), pp. 4832-4836

Pindado, Julio, Luis F. Rodrigues (2004). “Parsimonious Models of Financial Insolvency in Small Companies.” *Small Business Economics*, Vol. 22, No. 1 (February 2004), pp. 51-66

Sarma, Madira. (2008). “Index of Financial Inclusion”*. Indian Council for Research on International Economic Relations Working Paper 215, June 2008*.

World Bank. (2008). The Financial Development Report.

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