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Full Length Research Paper

Microfinance, inequality and vulnerability: Empirical analysis from Central African countries

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This study examines the relationship of microfinance, inequality and vulnerability by providing a cross-country empirical study of 11 developing countries in Central Africa. Microfinance plays an important role in the financial market in many African countries. Although microfinance is expected to significantly affect macro variables, we lack enough empirical research on impact analysis at the macro level, such as the effect of microfinance on inequality and vulnerability. Results indicate that the number of microfinance institutions has a negative impact on the Gini index in Central Africa countries. When the microfinance institutions in the country become dense, inequalities decrease.

Key words: Microfinance, inequality, vulnerability, cross-country analysis.

INTRODUCTION

Microfinance programmes and microfinance institutions have augmented in outreach over the last few years with their largest client being the poor, vulnerable and women. Their growth is visible in terms not just of number of active borrowers but also gross loan portfolio and total assets. Microfinance is widely recognized as a strategy to fight inequality, poverty and vulnerability. The term micro credit was first coined in the 1970s to indicate the provision of loans to the poor to establish income-generating projects. The term microfinance came to be used since the 1990s. Of late the terms micro credit and microfinance tend to be used interchangeably to indicate the range of financial services offered to the poor and vulnerable populations, low-income individuals/households and micro-enterprises (Brau and Woller, 2004).

Microfinance, as a financial service for the poor and vulnerable, is largely applied in developing countries and in developed countries. The question of the role of microfinance in reducing inequality and vulnerability remains valid today. We find this tool in European countries, American countries, as well as in Asian and African countries. Microfinance has become a popular part of poverty reduction agendas since its inception by Hulme and Mosley (1996). These authors have made clear that, capital investment is a key factor in determining economic growth and raising incomes. Although microfinance is defined as formal schemes designed to improve the wellbeing of the poor and vulnerable populations through better access to saving services, loans (micro credits), money transfers and micro insurances. Economic inequality or "wealth and income differences" comprises all disparities in the distribution of economic assets and income. The term typically refers to inequality among individuals and groups within a society, but can also refer to inequality among countries. Economic inequality generally refers to equality of outcome, and is related to the idea of equality of opportunity. It is a contested issue whether economic inequality is a positive or negative phenomenon, both on utilitarian and moral grounds. The concept of inequality can be discussed along three types of processes: Economic (income, employment and access to physical assets), social (access to health, education and social security) and political (rights to vote, access to political power and to legal institutions), and three different dimensions: geography (across regions), location (rural/urban) and across population groups (different gender, different ethnicity and different race). Otherwise, there is a large literature on intergenerational

JEL: O11, O47, D31, D63, C31, C32.

transmission of inequality (Piketty, 1998). Differences in national income equality around the world are measured by the Gini coefficient at national levels.

Vulnerability begins with a notion of risk and is defined as the ability of an individual or household to cope with risk and uncertainty (Knight, 1921). Risk, defined as the chance of a loss or the loss itself, is characterized by a known or unknown probability distribution of events. The concept of vulnerability expresses the multidimensionality of disasters by focusing attention on the totality of relationships in a given social situation which constitute a condition that, in combination with environmental forces, produces a disaster (Bankoff et al., 2004).

Since the impact of overall financial depth on inequality and on vulnerability seems to be obscure, we focus on the role of microfinance as a tool for financial depth endowed with the equalizing effect. Since microfinance directly eases the micro credit constraints on the poor and vulnerable, is it expected to reduce inequality? As a financial service for the poor and vulnerable populations, microfinance is largely applied in developing countries as low-rate finance, using the technique of individual and group lending. Microfinance institutions transfer the opportunity cost to borrowers by allowing them to carry out screening and monitoring. This paper is considering microfinance as a financial system that directly affects inequality and vulnerable populations and focuses on the relationship between microfinance, inequality and vulnerability.

This article provides an empirical cross-country analysis of eleven developing countries from Central Africa, concerning the impact of microfinance on inequality and vulnerability. Since the 1960s, informal and formal microfinance have grown with each passing year and now plays an important role in the financial markets of many developing countries in Africa. Although microfinance directly affect micro variables through specific channels (education, nutrition, housing, potable water, etc.), it is expected to significantly affect macro variables. However, there has not been enough empirical research on impact analysis at the macro level, such as the effect of microfinance on inequality and vulnerability.

Literature review

Since the 1970s, and especially since the new wave of microfinance institutions in the 1990s, microfinance has come to be seen as an important development policy, poverty, vulnerability and inequality reduction tool. According to Stewart et al. (2010), the assumption is that if one gives more micro credits to poor and vulnerable populations, inequality, poverty and vulnerability will be reduced. But the evidence regarding such impact is challenging and controversial, partly due the difficulties of reliable and affordable measurement, of fungibility, the methodological challenge of proving causality, and because impacts are highly context-specific (Brau and Woller, 2004; Hulme, 1997; Hulme, 2000; Makina and Malobola, 2004; Sebstad and Cohen, 2000).

Questions regarding the impact of microfinance on the welfare and income of the poor have therefore been raised many times (Copestake, 2002; Hulme and Mosley, 1996; Khandker, 2003; Rogaly, 1996; Stewart et al., 2010). Despite various researches, the question of the effectiveness and impact on the poor of microfinance programmes is still highly in question (Westover, 2008). Roodman and Morduch (2009) reviewed studies on micro credit in Bangladesh, and similarly conclude that “30 years into the microfinance movement we have little solid evidence that it improves the lives of clients in measurable ways.” Even the World Bank (2007) indicates that “the evidence from micro-studies of favorable impacts from direct access of the poor to credit is not especially strong.”

The difference in income between the rich and the poor is rather significant in developing regions such as Central Africa, causing serious problems in their societies. Further, financial depth eases the micro credit constraints on the poor and the vulnerable populations and increases their productive assets and productivity, thus contributing to poverty reduction (Hulme and Mosley, 1996; World Bank, 2001; Jalilian and Kirkpatrick, 2002; Kai and Hamori, 2009b). However, others argue that financial deepening only benefits the rich, thus increasing inequality and vulnerability. Beck et al. (2004) points out that since the poor and vulnerable populations depend mainly on informal finance such as borrowing from relatives, communities or friends, the development of the financial sector is beneficial only to the wealthy.

Ahlin and Jiang (2008) describe a model in which the adoption of microfinance is considered a financial development and show that microfinance decreases inequality. According to them, microfinance lowers inequality by increasing the income of the poor and lowering the income of the wealthy, since the wages paid by employers increase. Green et al. (2006) argue that improvement in the financial access of the poor and vulnerable populations can directly enhance poverty reduction, since an imperfect financial market, which excludes the poor and the vulnerable populations, is an important factor that affects poverty (Stiglitz, 1998). As such, although the equalizing effect of microfinance can be explained theoretically, we lack sufficient research information on the empirical analyses of this study.

What mainly exist are impact analyses at the household level (micro level), such as analyses of the effect of microfinance on household income or consumption. There is a consensus that microfinance decreases the consumption volatility of households and leads to consumption smoothing and increased production (Khandker, 1998; Parker and Nagarajan, 2001; Zaman, 2001; Cuong et al., 2007). However, impact analyses such as the effect of microfinance on income or poverty

reduction are controversial, provide different results for different subjects, and lack universality. For example, Pitt and Khandker (1998) show that microfinance increases household consumption,- while Morduch (1998) indicates that microfinance does not have a significant impact on consumption. Mosley and Hulme (1998) shows that micro-finance does not offer micro credits to the poorest of people or the vulnerable populations.

The impact of microfinance is not a simplistic debate on whether microfinance is transformative or ruinous. It is much more complex. Thus far literature reviews of empirical researches of the impact of microfinance on the poor found controversial and inconclusive findings. Such findings are classify into a three-fold typology: (1) Those studies that find beneficial socio-economic impacts, such as income stability and growth, reduced income inequality, reduced vulnerability, employment, nutrition and health improvements, school attendance, strengthened social networks, and women's empowerment (Beck et al., 2004; Khandker, 2003); (2) those studies that allude to negative impacts, such as the exploitation of women, unchanged poverty levels, increased income inequality, increased workloads, high interest rates and loan repayment, creating dependencies, and creating barriers to sustainable local economic and social development (Copestake, 2002; Rogaly, 1996); and (3) those studies that show mixed impacts. For example, benefits for the poor but not for the poorest (Mosley and Hulme, 1996; Morduch, 1998), the vulnerable or helping the poor to manage the money they have but not directly or sufficiently increasing income, empowering women, among others. Husain et al. (2010) argues that money spent on microfinance could be better used for other interventions, like supporting large labor-intensive industries for job creation. And there is literature that argues that a single intervention (like microfinance) is much less effective as an anti-poverty resource than simultaneous efforts that combine microfinance, health, education, among others. Yet, only a few impact analyses have been performed at the macro level, and there have been few researches on the impact of microfinance on inequality and vulnerability.

The analysis of the macroeconomic factors influencing microfinance performance is an emerging trend in the mainstream literature. The focus of existing studies so far can be divided into three broad categories: (1) The analysis of microfinance specific determinants of performance such as contract design, lending methodology and corporate governance (Hartarska, 2005; Hartarska and Nadolnyak, 2007, 2008; Hermes et al., 2009; Caudill et al., 2009), (2) macroeconomic factors determining the uneven distribution of microfinance and the impact of country-level aggregates such as growth, inflation, poverty and corruption (Marconi and Mosley, 2005; Honohan, 2004, 2008; Vanroose, 2007, 2008; Vanroose and D'Espallier, 2009); and (3) the analysis of macro-institutional determinants of microfinance success by disentangling the impact of microfinance sustainability factors and the external environment they operate in (Ahlin et al., 2010).

From Stewart et al. (2010), recently this debate became heated when the findings of two randomised control trials (RCTs) in the Philippines and India by the Massachusetts Institute of Technology's Jameel Poverty Action Lab (Karlan and Zinman 2010; Banerjee et al., 2009) that raised questions about the impact of microfinance on improving the lives of the poor. These researches did not find a strong causal link between access to microfinance institutions and poverty, vulnerability and inequality reduction for the poor. The results of these first RCTs in the field of microfinance have spawned a heated debate. Six of the biggest network organizations in microfinance - Accíon International, FINCA, Grameen Foundation, Opportunity International, Unitus, and Women's World Banking - in their reluctance to accept the findings, responded by pointing to anecdotal evidence of the positive impact of microfinance, while also highlights the weaknesses of these researches.

Their criticisms included the short timeframe, small sample size, and the difficulty of quantifying the impact of microfinance. Rosenberg (2010) of the Consultative Group to assist the poor (CGAP) reacted to these six network organizations: "But let's be straightforward here. The main value proposition put forward on behalf of micro credit for the last quarter century is that it helps lift people out of poverty by raising incomes and consumption, not just smoothing them. At the moment, we do not have very strong evidence that this particular proposition is true, and I do not think we should be putting out public relations material that fudges the issue or suggests that we do have such evidence." This debate between researchers and practitioners continues to rage on blogsites (Banerjee et al., 2009; Easterly, 2010) and in the media Boston Globe (Bennett, 2009), The Economist (2009), Financial Times (Hartford, 2009), The Seattle Times (Helms, 2010), New York Times (MacFarquhar, 2010). In 2010 the publication of a new book by Hanlon, Barrientos and Hulme, complicates the debate by calling for cash transfers directly to the poor. There is clearly a need for rigorous systematic reviews of the evidence of the impact of microfinance on inequality, vulnerability and poverty. The effect of microfinance on inequality, on poverty and vulnerability has been examined only within a region of a particular country or within a particular country using qualitative and quantitative methodologies.

But since the appearance of the cross-country analysis in 1961, with the research carry out on the constant elasticity of substitution (CES) production function by Arrow et al (1961)many others papers was based on a cross-country regression of the log of value added per worker on the log of wage rate. A recent cross-country analysis has been conducted by Kai and Hamori (2009a) on microfinance and inequality. Cuong et al. (2007) analyzed the Vietnam Bank for social policies and concluded that it lowers inequality, but its effect is

insignificant. Mahjabeen (2008) used the computable general equilibrium (CGE) model to show that microfinance in Bangladesh lowers inequality. Yet there is no sufficient empirical information on the effect of microfinance on inequality, so further analysis is required.

METHODOLOGY

Model presentation

Following Kai and Hamori (2009a) and in accordance with empirical researches by Milanovic (2002), who has studied the variation in global inequality across countries over 15 years, we use the cross-country regression analysis to examine the impact of microfinance on inequality and vulnerability in some developing countries. Our empirical analysis is based on data from Central Africa countries. The empirical specifications are as follows:

$$Y_i = \alpha + \beta_1 M_i + \beta_2 V_i + \eta X_i + u_i \quad (1)$$

$$Y_i = \alpha + \beta_1 LogM_i + \beta_2 LogV_i + \eta X_i + u_i \quad (2)$$

In the models (1) and (2), Y_i indicates the inequality measure; M_i represents the degree of microfinance intensity; V_i represents the degree of vulnerability intensity; X_i is the vector of control variables; and u_i denotes random disturbance (i: country). Model (1) is the specification that includes microfinance intensity for the purpose of examining the effects of microfinance on inequality and on vulnerability. Model (2) is the specification in which the logarithm of microfinance intensity and vulnerability intensity is employed to examine the equalizing effect of microfinance. These specifications are used to see if our empirical results are robust to the choice of microfinance intensity. The degree of microfinance intensity is included in order to assess the impact of microfinance on inequality and on vulnerability. We use the number of microfinance and the number of borrowers in a country as the measures of microfinance intensity. We can expect that microfinance eases the micro credit constraints on the poor, thus decreasing inequality. Inequality can be decomposed into the rich and poor group. Within the context of poverty dynamics, one speaks of chronic and temporary poverty (Chaudhuri and Ravallion, 1994). In terms of vulnerability, one might consider the chronically poor as very vulnerable, the temporarily poor as vulnerable, and the non-poor as non-vulnerable. The poor group can also be declined into two sub-groups: vulnerable populations and non vulnerable populations. Vulnerable populations are some populations in the community sharing common characteristics that make them more susceptible to “falling through the cracks”. Three other sub-groups are identified under such vulnerable populations: the elderly, people with disabilities, and young children. All these three sub-groups are vulnerable to financial constraints, a lack of available resources and services, and insufficient public awareness of their situations. All three often find it difficult to advocate for, or provide for all of their needs themselves, and must rely on others for at least some support services. In this work we are interested in the sub-group, concerning the vulnerable populations.

The analysis also includes control variables such as the logarithm of GDP per capita and its square term, the inflation rate, the democracy index, and some regional dummies. We assume that a higher income level increases inequality and vulnerability, but its effect declines after a certain point. Furthermore, these analyses include globalization as openness in order to assess the impact of openness on inequality and on vulnerability. So the trade (export and import) to GDP ratio is used as the measure of openness, following empirical studies such as Milanovic (2002) and Wade (2004).

To simplify the empirical model is presented as follows:

$$Y_{i,t} = f_i + \mu_t + \beta X_{i,t} + u_{i,t} \quad (3)$$

Where $Y_{i,t}$ represents the value of the variable to be explained by taking the country i at the time t. In this case the Gini index of country i in year t; f_t individual fixed effect individuals or countries fixed effect; u_t temporal fixed effect or annual fixed effect; $X_{i,t}$ is the matrix of explanatory variables or value taken by country i at time; $u_{i,t}$ the error term by country i.

The variables used are: GINI: GINI index; Logf: the logarithm of the number of microfinance in the country; GDPcap log: the log of GDP per capita of the country; SqLogGDPcap: the square of the logarithm of GDP per capita of the country; Inflation: the inflation rate; Poverty or Vulnerability: poverty line; and Const: is the constant of the model.

Data sources

This contribution uses cross-sectional data from developing countries in Central Africa. Central Africa in the larger sense, is made up of the Central African Economic Community (CEEAC), represents an enlargement of groups in Central Africa such as the Central African Monetary Community (CEMAC), Cameroon, Central African Republic, Chad, Equatorial Guinea, Congo, and Gabon; the Economic Community of the Great Lakes (CEPGL), made up of the Democratic Republic of the Congo, Burundi, Rwanda, Angola, and Sao Tome and Principe. In all, Central Africa is basically the Congo Basin. In the CEMAC Region, the Banking Commission for Central African States know as COBAC has the CEMAC regulation relating to the conditions governing the exercise and the control of microfinance activities adopted in 2002 (microfinance regulation nº 01/02/CEMAC/UMAC/COBAC).

Data is obtained from World Development Indicators (WDI) published by the World Bank. We use the 2007 cross-sectional data for regression, using the number of microfinance in a country as the measure of microfinance intensity. We also use the 2005 to 2007 pooled data for regression, using the number of borrowers in a country as the measure of microfinance intensity. Since the World Bank publishes inequality data almost every five years and its year of publication differs for various countries, the data for our analysis is the earliest available data, ranging from 2003 to 2007. The data on the number of MFIs in each country is obtained from the Microcredit Summit Campaign, from the Ministry in charge of Finance and from the Regional Central African Bank. The data on the proportion of population living under the line of poverty and the number of people undernourished or the proportion of people undernourished are obtained from African Economic Outlook and from FAO (2009).

RESULTS ANALYSES

The model (3) is estimated on the assumption of a uniformity of behavior across time and across countries. It supposes that the coefficients of the model are invariant over time and identical across countries. It also assumes that the errors are identical and follow the normal distribution N (0, σ). The model is estimated by the method of ordinary least squares (OLS).

The model specified previously implies that the coefficients obtained are identical for the 11 countries considered. However, it is possible to think that there are

Table 1. Model estimation with random effects.

GINI	Coefficient	Std. Error	Z	P>|z|	95% Confidence interval	
LogFI	-0.57	0.00	-1.79	0.07	0.00	0.00
LogGDPcap	4.91	3.64	1.35	0.18	-2.22	12.04
SqLogGDPcap	-0.32	0.23	-1.41	0.16	-0.76	0.12
Inflation	-0.21	0.11	-1.99	0.05	-0.42	0.00
Poverty_	0.44	0.09	4.68	0.00	0.25	0.62
Cons	5.38	14.93	0.36	0.72	-23.88	34.65
sigma_u	3.66		Wald Chi square	30.20	R^2 within	0.6267
sigma_e	0.213		Prob > Chi square	0.0000	R^2 between	0.4509
Rho	0.996				R^2 overall	0.4511
Random-effects		Number of observation =		33		
Group variable: countries		Number of groups =	11			

Source: Authors calculations.

differences between Central Africa countries in the functioning of their economies. It is therefore appropriate to specify and show the individual effects. That is why we adopt the third specification by introducing heterogeneity between countries. We assume that the coefficients behave identically across countries and time invariant, with the exception of the constant term which is supposed to be country specific. The specific effects to the country are assumed to be deterministic. We assume again that the errors are identical and follow the normal distribution N (0, σ).

The concern at this stage is whether the country-specific effects are significantly different. In other words, is the hypothesis of heterogeneity between countries in terms of inequalities validated? To test this hypothesis, we perform the Fisher test constructed as follows: Under the assumption of homogeneity of the country (H_O: $\alpha_1 = \alpha_2 = \ldots = \alpha_{11}$), the estimated model corresponds to the common effects model while assuming the presence of heterogeneity (H_1: $\exists$ i, j $\exists \alpha_i \neq \alpha_j$), the estimated model is the model to individual effects.

STATA software proceeds directly to the implementation of the Fisher test when estimating the fixed effects model. The individual effect α_i is presented in the form $\alpha_i=\alpha_0 + u_{.i}$. The homogeneity test of the countries is therefore to suppose for hypothesis H_0 that all errors $u_{.i}$ are equal to zero. Reading the Fisher test given previously leads to accept the assumption that all the $u_{.i}$ are equal to zero [F(10,17) = 445,96 and Prob > F = 0.5166]. It seems therefore that there are not among the 11 Central Africa countries specific individual effects to each country which explain these inequalities. Since the specific deterministic effect symbolized by constant values of each country is not found, it might seem more natural to treat this as a random effect. The random effects model to estimate is as follow:

$$GINI_{i,t} = \beta_0 logFI_{i,t} + \beta_1 logGDPcap_{i,t} + \beta_2 sqlogGDPcap_{i,t} + \beta_3 Inflation_{i,t} + \beta_4 Poverty_{i,t} + u_{i,t} \quad (4)$$

With $\mu_{i,t} = \alpha_i + \varepsilon_{it}$

To introduce into the analysis the specific effect as a random effect, we consider that error or residue u_{it} is composed by two elements: α_i and ε_{it}. The first element represents the individual effect, reflecting the influence on the rate of return variables that are not taken into account, since they are stable over time. The second represents the influences of other omitted variables also vary in time from one country to another. Assume that ε_{it} are identically and independently distributed. α_i are not correlated with explanatory variables.

The results of the estimation of random effects model shows that we have 3 R^2 statistics. The most relevant in the case of the random effects model is the R^2 between. It shows that 62.6% of the variability between countries of the GINI index is explained by the explanatory variables. The contribution of the random effects model country is 45% (Table 1).

The Wald test is 30.20, for a zero probability. It shows that the variables are jointly significant and therefore the coefficients can be interpreted in individual cases of significance and validation of model residuals. Conducting the Breusch-Pagan test to test the significance of random effects, we obtain chi-square statistic of 28.25 with a probability of zero. We can say that the 5% level, random effects are significant.

Regarding the significance of the variables, only the logarithm of GDP per capita (LogGDP) and the square of the logarithm of GDP per capita (SqLogGDP) are not significant in the model. The estimate reveals that the

number of microfinance is significant at 5%. The number of microfinance institutions has a negative impact on the Gini index, in other words, when the microfinance institutions in the country become density, more inequalities are reduced.

The main result of the empirical analysis implies a vertical flow from the rich to the poor or vulnerable populations that happens of its own accord. The benefits of economic growth go to the rich first, and then in the second round the poor or vulnerable populations begin to benefit when the rich start spending their gains. Thus, the vulnerable populations benefit from economic growth only indirectly through a vertical flow from the non vulnerable, the non poor or the rich. These results are in line with findings by Kai and Hamori (2009a). This research is significant. We have demonstrated the impact of microfinance on inequality and on vulnerability at the macro level.

Conclusions

Empirical researches on the impact of microfinance on vulnerable populations in Central African countries to enable policy-makers, donors, and practitioners to understand the nature of the evidence are available. We have identified, and synthesized here where possible, the available lessons: impact of microfinance on poor people, impact of microfinance on the incomes of the poor, impact of microfinance on wider poverty/wealth of the poor, impact of microfinance on other non-financial outcomes for poor. The findings suggest the appropriate measuring the impact of microfinance on vulnerable populations.

This paper provides a cross-country empirical study of developing countries in Central Africa, concerning the impact of microfinance on inequality and vulnerability. We show that microfinance plays an important role in creating a financial system endowed with the equalizing effect. Until now, only a few single-country analyses of the impact of microfinance on inequality and on vulnerability have been performed in Central Africa. A cross-country analysis has not been conducted thus far. Moreover, we contribute to the research accumulation of the impact assessment of microfinance at the macro level, which has seldom been analyzed. However, a new book edited by Hanlon et al. (2010), complicates the situation by calling for cash transfers directly to the poor.

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