

The Causal Relationship of Microfinance and Economic Development: Evidence from Transnational Data

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Abstract

The purpose of this study is to investigate the so far underexamined statistical causality of the relationship between microfinance and economic development. For a representative transnational dataset covering the period 1995 - 2012 we instrumentalize pairwise vector autoregressive (VAR) estimation models and the Granger approach. We utilize prevalent microfinance institutions' (MFI) performance indicators as measures of microfinance as well as relevant economic development indicators that not only measure economic and capital growth but also poverty, income inequality and labor participation. We find bidirectional causal interactions between both MFIs' social and financial performance and economic development. Based on our results important implications for microfinance theory, research and practice can be derived. Future empirical research should account for the statistical causality between microfinance and economic development. In practice, purposeful and progressive action that considers the directions of causality between microfinance and economic development verified within our study should be taken to promote economic growth and poverty alleviation.

Keywords: microfinance, social performance, financial performance, economic development, Granger causality

1. Introduction

Microfinance promises poverty alleviation, financial systems and economic development through serving people who are usually excluded from the formal banking sector (Morduch, 1999). Microfinance institutions (MFIs) are financial and social intermediaries that unite the characteristics of both formal and informal financial systems. On the one hand, they establish and improve the quality of (developing) financial sectors by offering access to credit for those at the bottom of the pyramid (Kamath, 2009). Then, by applying qualitative credit risk assessment approaches that consider factors such as clients' characters, willingness to repay and social standing (Tonelli & DalGLISH, 2011) MFIs contribute to the improvement of economic activities, productivity and ethics of repayment. The microfinance concept and MFIs thus ought to contribute to sustainable economic development by increasing not only short-term consumption levels and savings, but also education, self-employment and new businesses (Morduch, 1999).

As social enterprises that have a 'double bottom line' MFIs aim at balancing both their social and financial outcomes (Hudon & Périlleux, 2014). Current microfinance research and practice, therefore, distinguish between MFIs' social and financial performance and proxy social performance by their outreach to poor clients. The latter is quantified by indicators such as average loan balances, number of borrowers as well as percentage of female clients (Rosenberg, 2009). MFIs' financial performance is measured by their portfolio quality, profitability and returns. Nevertheless, in theory, MFIs should operate self-sufficiently, i.e. they have to cover their expenses through interest revenues and independent of subsidies (Prior & Argandoña, 2009; Rosenberg, 2009).

Prior literature has shown that, in fact, microfinance impacts economic development by increasing economies' capital and improving financial development (Armendáriz & Morduch, 2010; Kamath, 2009). Then again, current research suggests that economic development affects microfinance as they utilize economic development indicators such as gross domestic product (GDP) growth and gross national income (GNI) per capita when modeling microfinance and MFIs' performance (e.g., Assefa et al, 2013; Vanroose & D'Espallier, 2013). A clear deficiency of existing empirical studies is, however, that although they imply the causality of effects between MFIs' performance and their macroeconomic environment (e.g., Ahlin et al, 2011; Cull et al, 2015; Imai et al, 2012) they do not empirically question it on international level (Awojobi & Bein, 2011). Still, the verification of this relationship's

causality is of extraordinary economic importance as it is relevant for developing targeted microfinance strategies and for empirical research. In other words, in the case of a richer household that has obtained a larger loan, did the loan make the household richer or did the richer household simply have easier access to credit?

The objective of the present study is to answer this question. In particular, we aim at verifying the statistical causality between microfinance and economic development utilizing the Granger approach and transnational data. We add to current literature and research as, to the best of our knowledge, we are the first to present generalizable empirical evidence on the Granger causality between economic development and microfinance despite of practitioners' and researchers' missing common denominator with regard to the size of effects the microfinance concept has on economic development and poverty alleviation (Rajbanshi et al, 2015). Furthermore, we quantify microfinance by MFIs' performance thus assessing the MFI-specific contribution to economic development. In contrast, previous research has presented causality results based on macroeconomic aggregations of loan portfolios and capital (e.g., Imai et al., 2012; Maksudova, 2010) that do not allow the differentiation between MFIs' social and financial performance. We fill this research gap and quantify microfinance by several generally accepted MFI performance indicators namely, number of clients served, percentage of female borrowers, average loan balance, portfolio at risk, return on assets, operational self-sufficiency, and operating expenses. Then, we improve current research that has measured economic development by GDP growth and GNI (e.g., Eigbiremolen & Anaduaka, 2014; Maksudova, 2010; Vanroose & D'Espallier, 2013) and expand our analysis to further economic development indicators that have been found to interrelate with microfinance (e.g., Morduch, 1999). Hence, we consider not only GDP growth and lagged GNI per capita but also indicators such as poverty headcount ratio, income inequality, capital formation, labor participation as well as literacy rate. Last but not least, we base our analyses on a representative transnational dataset aggregating highly reliable MFI-specific data for 952 MFIs operating in 101 countries and for the period 1995 - 2012. We thus advance previous research that examines the causality between microfinance and economic development in individual countries (e.g., Eigbiremolen & Anaduaka, 2014; Nwakanma et al, 2014; Sharma et al, 2014).

The remainder of the paper is organized as follows. Following this introduction, we review current theory and research on the relationship between microfinance and economic development. The third section introduces our data and methodological approach. The empirical results are presented and discussed by the fourth section. The fifth section concludes.

2. Theoretical Background

2.1 Conceptual Framework

According to Joseph Schumpeter's *Theory of Economic Development* (1955), banks are the key to economic development as they channel society's savings to entrepreneurs who innovate. Then, according to King and Levine (1993), the level of financial development is associated with both the rate of physical capital accumulation and real per capita GDP growth. Particularly important for developing countries is, therefore, to achieve sustainable economic growth and financial systems development as they are shown to strongly interrelate. I.e. economic growth leads to an increasing demand for financial services which then enhances financial system development (Hassan et al, 2011).

Microfinance affects economic and financial systems development through several channels. The concept contributes to allocating capital, encouraging and monitoring investments as well as motivating consumption, entrepreneurship and productivity. Microfinance, therefore, does not only add value to individual and national incomes but also to levels of physical capital accumulation, for example by facilitating and allocating savings, as well as to levels of education and employment, for example by supporting (micro-)entrepreneurs and their families.

In practice, microfinance providers offer basic financial services in limited amounts to low-income, often underemployed persons and entrepreneurs with small, informal businesses (Bank for International Settlements, 2010). Compared to formal credit, microloans are rather small, have no typical collateral, and permit unsteady repayments. As microfinance clients often lack official financial statements MFI employees assess alternative values such as their characters, social standings and willingness to repay during field visits and applying a fairly qualitative credit risk assessment approach (Tonelli & Dalglis, 2011). Within this concept of sustainable social welfare development microfinance is specifically targeted at women (Morduch, 1999). As in developing countries they are often deficient in occupation and education women usually cannot serve with marketable loan guarantees. MFIs thus contribute to the empowerment of women by providing them with otherwise unattainable resources and supporting them to set up businesses as well as to achieving integrity and equality.

Small groups of people can also obtain microcredits. In such cases, the group members cross-guarantee each other. The microfinance concept, therefore, also accepts social relations as loan collateral. On the other hand, such

conformations add up to a further dimension of borrowers' repayment motivation. Still, the latter might be exploited by MFIs that exaggerate their recovery and profitability targets. Additional ethical issues inherent in the microfinance concept include over-indebtedness risks that are given when MFIs lend multiple credits to the same clients without appropriately advising them. The integrity and financial independence of microfinance clients might then be jeopardized by offensive operating policies such as interest rates of 80 to 100 per cent and improper repayment schemes (e.g., Schicks, 2014). Furthermore, attracted by promises for a win-win solution from which poor clients, financial institutions and economies profit (Morduch, 1999) new and more institutions have entered and expanded the microfinance market. This has, however, also led to increasing loan amounts and a drift from poorer to wealthier clients. Restricting their efforts to qualitatively assess and monitor their risks, MFIs have refocused from the contribution to economic development to cost reduction and profitability (Assefa et al, 2013; Cull et al, 2007). That given the trade-offs between their social, ethical, financial and economical objectives MFIs' overall equation of linking capital and labor inputs into profits and social change has proven difficult to master (Cull et al, 2007) is, therefore, not surprising.

2.2 Previous Empirical Evidence

When reviewing current literature and research on microfinance two mainstreams can be perceived. The first stream introduces profitability analyses of MFIs' self-sufficiency and thus examines microfinance from the perspective of individual MFIs. Qualitative and quantitative research verifies the significance of regional effects on MFIs' social and financial performance (e.g., Vanroose & D'Espallier, 2013). Age, size, lending methodology and operational costs are also shown to influence MFIs' performance and efficiency (e.g., Cull et al, 2007; Hudon & P é rilleux, 2014). Competition on the microfinance market is, however, shown to have a rather negative effect on MFIs' outreach and performance (Assefa et al, 2013). In fact, according to Cull *et al* (2007), institutions that have managed to achieve profitability while maintaining a significant business relationship with their original clients, i.e. the poor and low-income borrowers, thus achieving the ultimate promise of microfinance are exceptions. Although of relevance in particular for MFI practice, analyses based on MFI-individual sustainability, however, leave the long-term objectives of the microfinance concept, namely poverty alleviation, financial systems and economic development and thus the interdependent effects of its economic effectiveness unconsidered.

The second stream of microfinance literature presents macroeconomic research. The studies draw theoretical models of economic development and growth under the consideration of microfinance and its main outcome - the increase in capital stock (e.g., Armend á r iz & Morduch, 2010; Kamath, 2009). The absolute size of the effects microfinance has on economic development and poverty alleviation has, however, stayed a contentious research subject (Rajbanshi et al, 2015). Then, although due to the commercialization of the industry macroeconomic benefits such as volume increases, outreach to new clients as well as product and portfolio diversification might seem likely, these research issues are either only ambiguously verified or simply underexamined. In fact, studies by e.g., Awojobi and Bein (2011), Eigbiremolen and Anaduaka (2014) and Kamath (2009) offer empirical examinations on the macroeconomic effects of microfinance. However, these works base on data from only one country and thus face limited generalizability. MFIs' performance is also modeled as dependent on economic development (e.g., Ahlin et al, 2011; Imai et al, 2012). Current research, therefore, often implies the causality between microfinance and economic development but does not explicitly test for it. The latter is, however, of extraordinary theoretical and practical relevance. First, empirical research should account for the effects once this causality is verified. The directions of causality between microfinance and economic development should then find consideration in developing purposeful and systematic action to promote economic growth and poverty alleviation.

The limited empirical research on the causal interaction between microfinance and macroeconomic indicators includes Maksudova (2010) who quantifies microfinance by country and year averages of the growth rate of MFIs' gross loan portfolios. Macroeconomic indicators include annual growth rates of real GDP and money supply as well as increases of the ratio of private credit to GDP. For a cross-country sample comprising data for over 1400 MFIs from 102 countries and 14 years (1995 - 2009) the study proves that microfinance Granger causes GDP growth. The effects are, however, shown to differ depending on countries' development levels. The interactions between the growth rates of MFIs' gross loan portfolios and money supply as well as private credit turn out to be negative and Maksudova (2010) concludes that considering factual economic history this relationship's direction is ambiguous.

Eigbiremolen and Anaduaka (2014) also examine the Granger causality between microfinance and economic growth. They utilize MFI-level loan portfolios as a measure of microfinance and real GDP when quantifying economic growth as well as quarterly data for 11 years (1992 - 2012) and MFIs operating in Nigeria. Granger causality tests show a unidirectional causal relationship of economic growth to microfinance. That microfinance Granger causes

GDP cannot be significantly verified. This finding is confirmed by Nwakanma *et al* (2014) who also analyze the causality between economic growth and microfinance for data from Nigeria. Time series for 30 years (1982 - 2011) are explored utilizing autoregressive distributed lag and Granger approaches and year-level microcredit aggregations as well as real GDP as measures of microfinance and economic growth, respectively. Still, Nwakanma *et al* (2014) are also not able to verify the bidirectional causality between MFIs' credit volumes and Nigeria's GDP. Similarly, Sharma *et al* (2014) find for India and a period of 20 years (1992 - 2012) an unidirectional Granger causal relationship from economic development as quantified by GDP to microfinance again measured by year-level microloan volumes. The study also verifies a bidirectional causal relationship of microfinance and agricultural production which Sharma *et al* (2014) explain by the fact that microloans are usually provided to farmers and thus to the rural sector.

Although pioneering the microfinance and economic research these analyses are not free from limitations and cannot be generalized on an international level due to their datasets and measurement approaches. The aim of the present study is, therefore, to shed light on this important economic and financial research issue and to investigate possible statistical causalities between microfinance and economic development utilizing the Granger (1969) approach, generally accepted microfinance and development measures and a large transnational dataset.

3. Materials and Methods

3.1 Data and Variable Description

In order to empirically examine the causality of microfinance and economic development we refer to the period 1995 - 2012 and quantify microfinance performance by the social and financial performance of MFIs (Rosenberg, 2009). By instrumentalizing MFIs' performance as a measure of microfinance we consider both the quantity and quality aspects of microfinance operations and thus extend previous empirical research where microfinance is quantified by aggregated microloan volumes or gross loan portfolios (Eigbiremolen & Anaduaka, 2014; Maksudova, 2010; Nwakanma *et al*, 2014; Sharma *et al*, 2014).

We obtain financial institution-specific data for 952 MFIs from 101 countries from the Microfinance Exchange Market (MIX) database. One limitation of our dataset is given by the characteristics of MIX Market where MFIs self-report data on their annual financial statements. As MFIs have to invest their own resources for this voluntary reporting, the database might under-represent smaller microfinance providers (Maksudova, 2010). Nevertheless, as it is the most exhaustive platform including data on worldwide operating MFIs, the MIX Market database has been used by the majority of empirical studies on microfinance (e.g., Cull *et al*, 2007; Maksudova, 2010; Vanroose & D'Espallier, 2013). Furthermore, the database assesses institutions' reporting quality and offers information on whether MFIs' financial statements were audited by third-party accounting firms. To ensure the reliability of our results we consequently exclude financial statements that were not audited prior to data selection (Ahlin *et al*, 2011). We thus further improve the quality and representativeness of our dataset as compared to previous research (e.g., Maksudova, 2010; Vanroose & D'Espallier, 2013).

In line with the World Bank's Consultative Group to Assist the Poor (Rosenberg, 2009) as well as prior literature (e.g., Assefa *et al*, 2013; Cull *et al*, 2007), we refer to number of clients served, percentage of female borrowers, average loan balance per client, portfolio at risk, return on assets, operational self-sufficiency and operating expenses as microfinance performance measures. The first three performance indicators measure MFIs' social performance, the latter four - to their financial performance (Rosenberg, 2009). To ensure the robustness of our results we eliminate the influence of outliers by winsorizing the MFI-specific data to the 1st and 99th percentiles. In order to conduct reasonable time series tests we then aggregate the MFI performance indicators to their year and country means (Maksudova, 2010) and totals for the number of clients served, respectively (Imai *et al*, 2012).

Considering the mutual dependence of development parameters and in line with prior literature (e.g., Ahlin *et al*, 2011; Islam *et al*, 2015; Lopatta & Tchikov, 2016; Schicks, 2014) we measure economic development by several economic development measures namely, poverty headcount ratio, GINI coefficient of income inequality, GDP growth, lagged GNP per capita, lagged gross capital formation, lagged labor participation rate as well as literacy rate. The measures of economic development included in our study are obtained from the World Bank's World Development Indicators (WDI). Lagged values are calculated in order to achieve better comparability between microfinance performance and economic development for the transnational dataset. Nevertheless, due to time-series data availability for some of the indicators non-lagged, absolute values had to be taken. Detailed descriptions of all variables utilized in our study are presented in Table 1:

Table 1. Variable names and descriptions

Name	Variable	Description
MFIs' social performance		
NOB	Number of clients served	Total number of the clients served by MFIs as a ratio to countries' populations
PFB	Percentage of female borrowers	Yearly average of the number of MFIs' female borrowers as a ratio to their total active borrowers
ALB	Average loan balance per client	Yearly average loan balance per client as a ratio to countries' GNI per capita
MFIs' financial performance		
PAR	Portfolio at risk	Yearly average portfolio at risk as the ratio of MFIs' loan balances past due more than 30 days and its gross loan portfolio
ROA	Return on assets	Yearly average of MFIs' net operating income less taxes as a ratio to their average asset value
OSS	Operational self-sufficiency	Yearly average operational self-sufficiency as a ratio of MFIs' financial revenue and their financial expenses, impairment loss and operating expenses
OPX	Operating expenses	Yearly average operating expenses as a ratio to MFIs' gross loan portfolio
Economic development indicators		
PHC	Poverty headcount ratio	Percentage of population living on less than 1.25 US dollars a day at 2005 international prices
GINI	GINI coefficient	Extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution whereas small index values indicate equality and large values imply inequality
GDPG	GDP growth	Annual percentage growth rate of the sum of gross value added by all resident producers in the economy at market prices
GNP	GNP per capita	Lagged gross national income converted to international dollars using purchasing power parity rates per capita
GCF	Gross capital formation	Lagged additions to the fixed assets of the economy plus net changes in the level of inventories as percentage of GDP
LPR	Labor participation rate	Lagged proportion of the population aged 15 and older that is economically active
LIT	Literacy rate	Percentage of the population age 15 and above who can, with understanding, read and write a short, simple statement on their everyday life including the ability to make simple arithmetic calculations

Sources: MIX database, World Bank and own calculations.

According to the summary statistics as presented in Table 2 MFIs' performance and economic development strongly vary across the countries within our sample. Indeed, microfinance performance is found to empirically depend on the region in which MFIs operate (Vanroose & D'Espallier, 2013) - a fact that could be explained by different development levels, cultural backgrounds and mindsets as well as economic understanding, for example with regard to loan repayment (Lopatta & Tchikov, 2016). Our summary statistics and relevant literature, therefore, also indicate the necessity of representative empirical examinations of the causal relationship between microfinance and economic development at a global, transnational level and highlight the limited generalizability of results based on data from one single country (e.g., Egbiremolen & Anaduaka, 2014; Nwakanma et al, 2014; Sharma et al, 2014).

Table 2. Summary statistics

Variable	Obsv.	Mean	Std. Dev.	Minimum	Maximum	Country at Min.	Country at Max.
NOB	1015	0.0117	0.0193	0.0000	0.1143	Gambia	Bangladesh
PFB	974	0.6504	0.2218	0.0464	1.0000	Burundi*	Burkina Faso*
ALB	1031	0.6845	0.7247	0.0208	4.9342	Mexico*	Gambia*
PAR	976	0.0555	0.0542	0.0000	0.4725	Tonga*	Samoa
ROA	950	-0.0032	0.0939	-0.4812	0.2060	Samoa	Jamaica
OSS	1038	1.0801	0.3482	0.1500	2.6744	Namibia*	Burundi
OPX	947	0.3639	0.4307	0.0000	8.2850	Paraguay	Cote d'Ivoire
PHC	375	15.4969	18.3384	0.0200	87.7200	Russia	Congo
GINI	388	43.5533	9.6142	24.2400	67.4000	Romania	South Africa
GDPG	1035	5.0465	4.2879	-14.8000	46.5000	Ukraine	Iraq
GNI	992	0.0599	0.0619	-0.4194	0.9444	Congo	Congo
GCF	974	0.0386	0.3435	-0.8943	9.4482	Nepal	Nepal
LPR	1008	0.0004	0.0120	-0.0885	0.0722	Ecuador	Romania
LIT	206	80.2389	19.4150	21.8229	99.7598	Burkina Faso	Azerbaijan

* indicates countries that were not the only ones at the minimum or maximum points for the period 1995 - 2012. Still, they were at these points for the longest time within the sample period.

3.2 Methodology

In order to verify the causal relationship between microfinance and economic development we follow Wooldridge (2013) and pairwise estimate vector autoregressive (VAR) models for each country in our sample such as:

$$y_t = \delta_0 + \alpha_1 y_{t-1} + \gamma_1 z_{t-1} + \alpha_2 y_{t-2} + \gamma_2 z_{t-2} + \dots \tag{1}$$

and

$$z_t = \eta_0 + \beta_1 y_{t-1} + \rho_1 z_{t-1} + \beta_2 y_{t-2} + \rho_2 z_{t-2} + \dots \tag{2}$$

Here y_t and z_t are two series modeled in terms of their own past values and $\alpha, \beta, \gamma, \delta, \eta,$ and ρ are linear regression coefficients. Given past information on y and z the error term is expected to equal zero.

We then run Granger causality tests (Hassan et al, 2011; Nwakanma et al, 2014; Qin & Ndiege, 2013) as the multivariate time series diagnostic approach for determining whether past values of one variable are useful for predicting another one. In particular, based on the VAR models we test whether, after controlling for past y , past z can forecast y . z thus Granger causes y when

$$E(y_t | I_{t-1}) \neq E(y_t | J_{t-1}) \tag{3}$$

Where I_{t-1} comprises of past values of y and z , while J_{t-1} only includes past values of y . That is, if equation (3) holds, past values of z are only useful for predicting y_t under the consideration of past values of y (Wooldridge, 2013: 631).

Accordingly, in order to examine the Granger causality between microfinance and economic development we employ the following model:

$$Economic\ development_{i,t} = \delta_0 + \alpha_1 Economic\ Development_{i,t-1} + \gamma_1 MFI\ performance_{i,t-1} + \alpha_2 Economic\ Development_{i,t-2} + \gamma_2 MFI\ performance_{i,t-2} + \dots \tag{4}$$

For country i in year t *Economic Development* and *MFI performance* are quantified by the measures as described above. $\alpha, \gamma,$ and δ are still linear regression coefficients.

4. Results and Discussion

We present test results as in line with Qin *et al* (2013) in Table 3. In order to achieve better presentation of results we refrain from tabulating equations where due to data availability no test results could be yielded.

Table 3. Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2	Equation	Excluded	chi2	df	Prob > chi2
PHC	PFB	3.2148	2	0.2000	GCF	NOB	4.5550	2	0.1030
PFB	PHC	1.7597	2	0.4150	NOB	GCF	1.2532	2	0.5340
PHC	ROA	0.8096	2	0.6670	GCF	PFB	7.8548	2	0.0200**
ROA	PHC	5.8084	2	0.0550*	PFB	GCF	8.4359	2	0.0150**
PHC	OPX	40.2890	2	0.0000***	GCF	ALB	30.9830	2	0.0000***
OPX	PHC	3.9911	2	0.1360	ALB	GCF	1.5844	2	0.4530
GINI	PFB	2.7608	2	0.2510	GCF	PAR	1.5247	2	0.4670
PFB	GINI	22.8610	2	0.0000***	PAR	GCF	182.6700	2	0.0000***
GINI	ROA	7.7503	2	0.0210**	GCF	ROA	30.3670	2	0.0000***
ROA	GINI	32.7740	2	0.0000***	ROA	GCF	10.8280	2	0.0040***
GINI	OPX	6.0274	2	0.0490**	GCF	OSS	12.8260	2	0.0020***
OPX	GINI	37.7250	2	0.0000***	OSS	GCF	7.0404	2	0.0300**
GDPG	NOB	0.7811	2	0.6770	GCF	OPX	0.7179	2	0.6980
NOB	GDPG	3.2371	2	0.1980	OPX	GCF	167.4200	2	0.0000***
GDPG	PFB	19.7150	2	0.0000***	LPR	NOB	16.8710	2	0.0000***
PFB	GDPG	4.3801	2	0.1120	NOB	LPR	0.0753	2	0.9630
GDPG	ALB	230.8500	2	0.0000***	LPR	PFB	11.8860	2	0.0030***
ALB	GDPG	6.1759	2	0.0460**	PFB	LPR	2.9403	2	0.2300
GDPG	PAR	0.7202	2	0.6980	LPR	ALB	166.6200	2	0.0000***
PAR	GDPG	4.7841	2	0.0910*	ALB	LPR	34.0980	2	0.0000***
GDPG	ROA	0.8491	2	0.6540	LPR	PAR	1.0429	2	0.5940
ROA	GDPG	4.4964	2	0.1060	PAR	LPR	0.7184	2	0.6980
GDPG	OSS	11.5710	2	0.0030***	LPR	ROA	5.2649	2	0.0720*
OSS	GDPG	4.5997	2	0.1000	ROA	LPR	26.2830	2	0.0000***
GDPG	OPX	14.7900	2	0.0010***	LPR	OSS	4.0555	2	0.1320
OPX	GDPG	66.6270	2	0.0000***	OSS	LPR	0.6162	2	0.7350
GNI	NOB	1.6708	2	0.4340	LPR	OSS	4.0555	2	0.1320
NOB	GNI	58.0740	2	0.0000***	OSS	LPR	0.6162	2	0.7350
GNI	PFB	56.7640	2	0.0000***	LIT	ALB	1.3e+24	1	0.0000***
PFB	GNI	8.9347	2	0.0110**					
GNI	ALB	12.7140	2	0.0020***					
ALB	GNI	213.6700	2	0.0000***					
GNI	PAR	1.5807	2	0.4540					
PAR	GNI	19.1870	2	0.0000***					
GNI	OSS	1.0037	2	0.6050					
OSS	GNI	0.3369	2	0.8450					

The zero hypothesis in Granger causality Wald tests aims at proving that excluded variables do not Granger cause the corresponding equation variables.

* (Prob > chi2) < 0.1, ** (Prob > chi2) < 0.05, *** (Prob > chi2) < 0.01.

Significant Granger tests yield an unidirectional causal relationship of MFIs' profitability as measured by their return on assets (ROA) as well as MFIs' efficiency as measured by their operating expenses (OPX) to country-level poverty headcount ratios (PHC). In particular, test results indicate that Granger causality is given from ROA to poverty and from poverty to OPX. The interrelation between percentage of female borrowers (PFB) and income inequality (GINI) is also only unidirectional causal, i.e. PFB Granger causes GINI but GINI does not (significantly) Granger cause PFB. Significant bidirectional Granger causality is then found between income inequality and both MFIs' ROA as well as operating expenses. Also, the relationship of MFIs' percentage of female borrowers and GDP growth (GDPG) is only shown to be one-way Granger causal with causality going from GDPG to PFB. In contrast, the interaction between average loan balances (ALB) and GDP growth is found to be two-way causal. Our analyses then point to unidirectional Granger causality of MFIs' portfolio quality as measured by portfolio at risk (PAR) to GDP growth and from GDP growth to MFIs' operational self-sufficiency (OSS). The relationship between MFIs' operating expenses and GDP growth is, however, found to be two-way Granger causal. A further unidirectional causal relationship is found for MFIs' number of borrowers (NOB) and GNI per capita with NOB Granger causing GNI. On the other hand, both MFIs' percentage of female borrowers (PFB) and average loan balances (ALB) as MFIs' social performance measures are shown to bidirectional causally interact with GNI per capita. Our test results then point to unidirectional Granger causality of portfolio at risk to GNI per capita. The interrelation between percentage of female borrowers (PFB) and gross capital formation (GCF) is also shown to be bidirectional causal. In contrast, ALB and gross capital formation are found to interact unidirectional causal with GCF Granger causing MFIs' average loan balances. Then, while our tests yield significant bidirectional Granger causality between ROA and OSS and gross capital, Granger causality of MFIs' portfolio at risk (PAR) as well as operating expenses (OPX) to GCF is only unidirectional. The relationships of number of borrowers (NOB) as well as percentage of female borrowers (PFB) and labor participation (LPR) are also unidirectional causal whereas results indicate that labor participation rates Granger cause MFIs' social performance. The interrelations between average loan balances (ALB) as well as MFIs' return on assets and labor participation are, however, found to be two-way causal. With regard to literacy rates (LIT) due to limited availability of time series data only one significant result could be obtained, namely the unidirectional causality of LIT to average loan balances.

Our analyses thus indicate that MFIs' social performance in terms of percentage of female borrowers and average loan balances is bidirectional causally related with economic development as measured by GNI per capita. Our results further confirm current research that has verified unidirectional Granger causality from economic development to microfinance (Eigbiremolen & Anaduaka, 2014; Nwakanma et al, 2014; Sharma et al, 2014). Then, the two-way causal relationship between MFIs' average loan balances as a proxy of microfinance clients' poverty levels (Rosenberg, 2009) and labor participation highlights the strong interaction microfinance has with (micro-)entrepreneurship (Morduch, 1999). On the other hand, the fact that the Granger tests yield no evidence on causality between number of borrowers and the majority of economic development indicators confirms Lopatta and Tchikov (2016) who state that microfinance should not be about quantity but rather about quality in terms of more female clients and small loan amounts.

The Granger tests with regard to the causal interrelations of MFIs' social and financial performance indicators and gross capital formation also confirm current research that has demonstrated the influence microfinance has on capital accumulation (Hassan et al, 2011; Kamath, 2009). Still, as our results refer to effects between macroeconomic development indicators and MFI-specific performance they extend the perspective of existing studies that have examined the relationship between aggregate microloan portfolios and gross capital or GDP (Maksudova, 2010; Nwakanma et al, 2014).

That, according to our results, MFIs' profitability and efficiency as measured by return on assets and operating expenses causally interact with both economic development and income inequality, then confirms the ambiguousness of the effects MFIs' financial performance has on their long-term objectives as in line with current research (e.g., Cull et al, 2007; Morduch, 1999). The findings further suggest that MFIs' financial performance might contribute to financial systems and economic development but it also might be counterproductive for their clients' welfare and underline the importance of the 'mission drift' debate in current microfinance literature, i.e. the debate on MFIs' re-focus from the support of their poor clients towards profitability.

5. Conclusion

Within this study we have explored an underexamined though highly relevant research field - the causality between microfinance and economic development. Our Granger causality tests offer novel evidence on the causal role of microfinance in the economic development process. We add to current literature by being the first, to our knowledge,

to empirically differentiate between MFIs' social and financial performance and to verify their causal interaction with economic development. Furthermore, we extend current research by considering several economic development indicators that might be influenced by the concept of microfinance. We are thus able to validate the causal interrelation of microfinance with labor participation and entrepreneurship. Then, we present results that base on a large and representative transnational dataset that allows their cross-country generalizability.

The certainty about this causal relationship contributes to developing purposeful and progressive action to promote economic development and poverty alleviation. Based on our results, MFIs, development programs and socially responsible investors should align their social and financial performance strategies in order to achieve their 'double bottom line' targets. On the one hand, the bidirectional causality between MFIs' social performance, i.e. their percentage of female borrowers as well as average loan balances and economic development as well as labor participation shows that microfinance sustainably contributes to economic development. On the other hand, according to our results this microfinance-induced growth leads to a better social performance of MFIs and in fact suggests a win-win solution within the microfinance industry. MFIs' financial performance, i.e. return on assets and operating expenses, is, however, found to ambiguously interrelate with economic development, poverty alleviation and income inequality. Despite the capital effects microfinance might have on developing countries' economies MFIs should consciously steer their financial performance to a status that does not jeopardize their clients' welfare.

Our findings have also implications for microfinance theory and research. Future empirical analyses should consider them and statistically account for the causal interaction between microfinance and economic development. Future research should then overcome the limitations of our study due to restricted data availability and utilize additional (lagged) development indicators in order to better assess the interrelations of microfinance and economic development. Further country- and/or region-level analyses should then be conducted in order to enable deriving targeted measures aimed at concentrated economic development and poverty reduction.

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