Should microfinance institutions diversify or focus? A global analysis

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Abstract

This paper investigates the effects of revenue diversification on the financial performance of microfinance institutions (MFIs). The long-standing question about whether financial institutions should diversify or focus is a topic of ongoing debate. Using a global sample of MFIs, we investigate which view is appropriate for microfinance institutions. The results show that, diversification across revenue streams improves sustainability and profitability of MFIs. This suggests that revenue diversification is an important strategy for the sustainability of microfinance.

JEL classification: G21

Keywords: revenue diversification, financial performance, microfinance, sustainability, profitability

1. Introduction

This paper examines the effects of revenue diversification on the financial performance of microfinance institutions (MFIs). The paper is motivated by increasing trends of interest rates ceilings for MFIs. As of 2004, about 40 countries introduced interest rates ceilings to protect poor borrowers from high interest rates charged by micro-lenders (Helms and Reille 2004). In 2016, the Kenyan government for example, also established interest rate ceiling (The Economist, September 8, 2016) and on March 13, 2017, the National Bank of Cambodia announced interest rate ceiling for all MFIs in the country (Sokunthea 2017).

One effect of interest rate ceiling in the microfinance industry is reduced transparency concerning cost of loans. "MFIs influenced by interest rate ceilings have tried to cover their costs by imposing new charges and fees" (Helms and Reille 2004, 6). The new charges and fees are indirect costs of loans but less transparency makes the borrower unware of these costs. Moreover, the imposition of interest rates ceilings laws may force MFIs to find alternative sources of income to cover their huge operational costs. Interest rates are higher in microfinance than mainstream banking because of the high operational costs associated with smaller loans (Helms and Reille 2004, Fernando 2006, Mersland and Strøm 2013). Thus, revenue diversification in microfinance could possibly be as result of interest rates ceilings. In the global sample applied in this study, MFIs get income from non-interest sources including investment income, fees and commissions. However, as far as their sustainability is concerned, should MFIs diversify their revenue sources?

The question about whether financial institutions such as banks should diversify or focus is yet to receive a clear-cut answer. Empirical findings seem to support either view. For instance, Acharya, Hasan, and Saunders (2006) and Berger et al. (2010) find that diversification does not improve bank performance while Chiorazzo, Milani, and Salvini (2008), Cotugno and Stefanelli (2012) and Chen and Lai (2017) on the contrary document evidence to support diversification, it improves bank performance. Besides the mixed findings, common in the banking industry, there seems to be few empirical insights from the microfinance industry.

Microfinance is a poverty reduction tool with the primary aim of financial inclusion where poor people excluded from mainstream banking are provided with financial services (Armendáriz and Morduch 2010). Since the 1970s when the concept took its inception, many observers worldwide have praised microfinance for the achievement of its primary goal (Balkenhol and Hudon 2011, Biosca, Lenton, and Mosley 2014, Convergences 2017). Beside financial inclusion, microfinance also aims at being a financially sustainable concept, thus, it pursues a double bottom line which

Morduch (1999) describes as a "win-win" solution. Thus, MFIs are hybrid organizations pursuing both social and financial objectives. Like other social organizations, MFIs seek to enhance the welfare of the clients and like banks, MFIs aim to be profitable or at least break-even.

The microfinance industry is growing very fast, yet few scholars seem to pay attention to it concerning the diversification versus focus issue. For example, in 2016, MFIs provided microcredit to 132 million borrowers around the globe with USD 102 billion of loan portfolio (Convergences 2017). The annual growth rates in number of credit clients and loan portfolio between 2015 and 2016 are 9.6 and 9.4 percent respectively. Previous growth trends can be found in sources reporting on the state of microfinance including Microfinance Baraometer (Convergences 2017) and Microcredit Summit Campaign (Reed 2015). Additionally, evidence from the banking industry may not be applicable to the microfinance industry since MFIs are hybrid organizations. Commercial banks on the other hand are purely profit- oriented firms. Moreover, since there are real world cases to support both diversification and focus [see Winton (1999)], it makes sense to investigate which view is appropriate for micro-banks (MFIs) . Accordingly, this paper investigates the case of MFIs by answering the questions: should microfinance institutions diversify or focus? Is diversification helpful in attaining their financial objective? To answer these questions, the paper employs a unique global data set.

Scope studies in banking are often criticized since they are from a single country only [e.g. Acharya, Hasan, and Saunders (2006); Berger et al. (2010); Jouida, Bouzgarrou, and Hellara (2017)] or region [e.g. Bandelj (2016); Mercieca, Schaeck, and Wolfe (2007); Smith, Staikouras, and Wood (2003)], exceptions include Laeven and Levine (2007). This is a disadvantage we overcome with our global panel data set of 607 MFIs in 87 countries spanning 1998 -2015. This sample at least provides us with some international evidence on the diversification versus focus issue from the microfinance industry.

Finally, this paper is distinguished by its methodological approach from existing studies that conducted pure cross-sectional analysis. It uses panel data to investigate a "within" analysis and quantify the effects of variations in diversification for an MFI. The main advantage of this approach is that, it controls for important omitted variables such as MFI-specific and regional effects (Wooldridge 2011).

This paper could be relevant for policymakers who regulate the activities of MFIs. Like banks, the diversification versus focus issue is vital for MFIs as some of them are being regulated by banking authorities. Banking regulations may tend to incentivize banks or regulated MFIs to diversify or focus (Acharya et al., 2006; Berger et al., 2010, Hayden et al., 2007). Moreover, some MFIs collect deposits, making them delegated monitors on behalf of depositors (Diamond 1984). Effective monitoring of MFI's activities will depend on the degree of its diversification. The more diversified an MFI is, the more complex it becomes (Winton 1999) and this makes monitoring ineffective (Acharya, Hasan, and Saunders 2006, Hayden, Porath, and Westernhagen 2007). Thus, policymakers may find this paper relevant as to whether or not financial institutions benefit from diversification (Bandelj 2016). In this regard, it is important to investigate empirically the case of MFIs.

The results suggest that, diversification is helpful for the achievement of MFIs' financial objective. Specifically, revenue diversification improves sustainability and profitability of MFIs. The paper therefore makes an important contribution to the microfinance sustainability literature. The paper is among the first to provide empirical insights on the impact of diversification on the financial performance of MFIs. The findings imply that one way MFIs can be sustainable is to diversify into non-interest revenue streams. The revenue diversification premium could be attributed to the modern portfolio theory, which asserts that holding many imperfectly correlated investments results in net positive outcomes (Markowitz 1952).

The remainder of this paper unfolds as follows. Section 2 reviews the theoretical and empirical literature on diversification. In Section 3, information on data and estimation approach is provided. Section 4 presents and discusses the empirical results on the impact of revenue diversification on the financial performance of MFIs. Finally, Section 5 concludes the paper.

2. Literature review

2.1 Theoretical literature on diversification

Theoretically, firms diversify for a number of reasons including: risk management, efficiency, market power, resource exploitation, and managerial entrenchment (Chiorazzo, Milani, and Salvini 2008, Elsas, Hackethal, and Holzhauser 2010, Goddard, McKillop, and Wilson 2008, Klein and Saidenberg 1998). Portfolios theory, developed by Markowitz (1952), suggests that diversification leads to risk reduction and improved firm's value as long as assets returns are imperfectly correlated. For instance, expanding geographically requires "dissimilar" economies where correlations of returns of new and existing assets are low (Goetz, Laeven, and Levine 2014). Thus, diversification reduces total risk resulting in improved financial performance, as idiosyncratic risk is minimal if not eliminated in a well-diversified firm.

Diversification leads to increased operational efficiency through economies of scope as fixed costs are spread among a wide range of products and regions (Drucker and Puri 2009) and through joint production of financial services (Klein and Saidenberg 1998). Operational efficiency is particularly important for microfinance institutions as far as their sustainability is concerned. Given that MFIs are struggling with huge operational costs (Mersland and Strøm 2013), gaining operational efficiency through diversification could be a step in the right direction. Like banks, MFIs often enter into a long-term relationship with their customers allowing them to reuse previously gathered customer information without additional costs (Elsas, Hackethal, and

Holzhauser 2010). MFIs may also diversify to increase their market power if market competition intensifies (Goddard, McKillop, and Wilson 2008, Winton 1999) and to exploit resources in new markets (Goddard, McKillop, and Wilson 2008) or leverage managerial expertise among products and regions (Iskandar-Datta and McLaughlin 2007). Agency theory suggests that managers diversify their firms for private benefits including empire building or managerial entrenchment (Klein and Saidenberg 1998, Campa and Kedia 2002, Jensen 1986).

2.2 Empirical literature on diversification and financial performance

There is a growing body of empirical literature on the issue of diversification versus focus and performance of financial institutions. The findings are mixed and tend to follow two main streams of empirical research namely diversification premium and diversification discount. Proponents of diversifications suggest that banks can enhance profitability by diversifying across a wide range of business lines and regions. For instance, Deng and Elyasiani (2008) find that geographic diversification is positively correlated with bank's value. Similarly, Klein and Saidenberg (1998) find that geographic diversification is beneficial to banks. Efficiency opportunities associated with internal capital allocation can be exploited by expanding geographically. Campa and Kedia (2002) also document evidence that counteracts diversification discount and conclude that diversification is a value-creating strategy. Other authors find that revenue diversification improves bank's profitability, in terms of both unadjusted and adjusted returns on assets and equity [e.g., Chiorazzo, Milani, and Salvini (2008); Sanya and Wolfe (2010); Elsas, Hackethal, and Holzhauser (2010); Cotugno and Stefanelli (2012), Sissy, Amidu, and Abor (2017)] and these findings are robust during market instability (Cotugno and Stefanelli 2012) and even the sub-prime crisis (Elsas, Hackethal, and Holzhauser 2010).

In addition, Lamont and Polk (2001) argue that diversification discount must be investigated, taking into consideration both future cash flows and assets returns. They find that diversified firms with low value tend to have large future returns compared with diversified firms with high value. Graham, Lemmon, and Wolf (2002) also argue that diversification is not a value-destroying strategy, it depends on the financial health of the target firm prior to acquisition. Their findings suggest that, acquiring an already discounted firm will reduce the value of the acquirer, hence, diversification per se does not destroy firm's value.

Following the discussion on diversification premium evident in banking, we hypothesize that revenue diversification among microfinance institutions could lead to improved financial performance. This could be as a result of benefits associated with reduced risk based on portfolio theory and operational efficiency through economies of scale. Therefore, the first hypothesis to test in this study is as follows.

Hypothesis 1: There is a positive relationship between revenue diversification and financial performance of microfinance institutions.

On the other hand, opponents of diversification say it is a value-destroying strategy as existing management expertise gets diluted and agency costs increase. Other previous studies including Acharya, Hasan, and Saunders (2006), Hayden, Porath, and Westernhagen (2007) and Jouida, Bouzgarrou, and Hellara (2017) find that diversification is inversely related to bank's performance. Similarly, the findings of Berger et al (2010) suggest that MFIs should focus instead of diversifying. More focused banks tend to be cost-efficient resulting in higher profitability. Stiroh (2004) and Stiroh and Rumble (2006) find that income diversification does not improve financial institutions' net operating income as non-interest income tends to be highly volatile. These results are consistent to those of Goddard, McKillop, and Wilson (2008) who additionally report that income diversification is beneficial to only larger credit unions.

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Furthermore, Berger and Ofek (1995) find that diversification decreases firm's value and this is as a result of overinvestment or wasteful spending, and subsidization of segments with poor performance. Laeven and Levine (2007) report that banks' diversification through financial conglomerates is associated with lower market value. They argue that increased agency costs tend to offset gains from economies of scope.

Like banks, we also believe that diversification discount could be present among diversified MFIs too because of monitoring difficulties and operational inefficiencies. Having many financial activities could make MFIs wore off if competent management team is not put in place. Thus, for management control purposes, it may be financially sustaining for MFIs to focus than to diversify. To this end, we hypothesize that:

Hypothesis 2: There is a negative relationship between revenue diversification and financial performance of microfinance institutions.

Based on conflicting predictions from theory (portfolio theory versus agency theory), it may come as no surprise that empirical findings on the relation between diversification and financial performance are mixed. Overall, the studies from traditional banking do not offer an unambiguous expectation for the microfinance industry, and we therefore propose two alternative hypotheses. Conflicting prior research from other settings suggest that the effect of diversification is context dependent and it is an empirical question whether revenue diversification has a positive or negative relationship with financial performance in microfinance. Due to the ambiguity, all empirical tests will be two-sided.

3. Data and Methodology

3.1 Sample

Our sample is an unbalanced panel of 607 microfinance institutions observed over 18 years period (1998-2015). It is a global sample of MFIs from 87 countries (Table A1 in Appendix) covering six regions: East Asia and Pacific (56 MFIs), Eastern Europe and Central Asia (105 MFIs), Latin America and Caribbean (199 MFIs), Sub-Saharan Africa (176 MFIs), South Asia (46 MFIs), and Middle East and North Africa (25 MFIs). The data are collected from former ratingfund and rating initiative webpages as well as directly from the rating agencies (MicroRate, Microfinanza, Planet Rating, Crisil and M-Cril). All of the five rating agencies have been approved and supported by the Rating Fund of the Consultative Group to Assist the Poor (C-GAP), a microfinance branch of World Bank. Each of the rating reports contains data for the rating year and the previous years. At least, data are available for each MFI up to 18 years for the period 1998-2015. It is worth noting that, there is no perfect data set to accurately represent the microfinance industry (Strøm, D'Espallier, and Mersland 2016). Accordingly, the data set used for this paper does not cover all the small savings and credit cooperatives worldwide but majority of our MFIs are small in size.

In the microfinance industry, rating data are one of the sources of the most reliable and representative available data (Mersland and Strøm 2009). Rating MFIs, with support from donors such the Interamerican Development Bank and the European Union, is one of the main ways of achieving transparency in the industry (Beisland, Mersland, and Randøy 2014). The rating reports provided by the five agencies are much wider in scope of information compared to traditional credit ratings (Beisland and Mersland 2012). They cover a wide range of information including financial, outreach, ownership, regulation, governance, clients, financial products among others. Rating assessment is done in order to produce independent information for stakeholders' decision making purposes (Strøm, D'Espallier, and Mersland 2016). The sample for this study is an updated version of the data set used in Lensink et al. (forthcoming), Pascal, Mersland, and Mori (2017), Randøy, Strøm, and Mersland (2015), and Delgado et al. (2015).

3.2 Measures of diversification and financial performance

Diversification measure

There are three dimensions of diversification: across financial products and services, geographic expansion, and a combination of these two (Mercieca, Schaeck, and Wolfe 2007). This paper is concerned with the first dimension. Specifically, this study investigates the effects of revenue diversification on the financial performance of MFIs. As mentioned earlier, the motivation for investigating revenue diversification in this study is because of the increasing trends of interest rates ceilings many MFIs face worldwide. Currently, over 40 countries have established interest rates ceilings to protect the poor borrowers from high interest rates charged by microlenders (cf. Helms and Reille, 2004; Mbengue, 2013). The interest rates ceilings suggests that MFIs may have to find alternative revenue-generating activities to cover their operational costs in order to stay in business. Hence, we investigate the influence of revenue diversification on MFIs' financial performance.

We follow other scholars [e.g., Jouida (2017); Stiroh and Rumble (2006); Stiroh (2004); Morgan and Samolyk (2003)] to construct Herfindahl-Hirschmann Index for revenue diversification for each MFI. The measure of revenue diversification (DIV) takes into consideration various sources of net operating revenue, which are broadly grouped into two categories: interest and non-interest. *Interest* represents net interest income from loan portfolio while *non-interest* represents all non-interest income including investment income, fees and services charges, among

others. Based on this breakdown, we construct our revenue diversification measure for MFIs as follows.

$$DIV = 1 - \left[\left(\frac{Interest}{Netop}\right)^2 + \left(\frac{Non-interest}{Netop}\right)^2\right] \qquad (1)$$

Where NetOp = net operating revenue and it is the sum of *interest* and *non-interest* revenue. DIV measures the level of diversification of an MFI's net operating revenue. Increase in DIV means that an MFI becomes more diversified as far as revenue sources are concerned and a figure close to zero indicates that all operating revenue nearly comes from one source, thus, an MFI is more focused.

For robustness checks, we alternatively measure revenue diversification in terms of the share of non-interest income (*share-non*) defined as non-interest income as a proportion of total net operating revenue. Increase in *Share-non* also indicates that an MFI is diversifying into non-interest revenue generating activities. Thus, institution is becoming more diversified.

Financial performance measures

As mentioned earlier, this paper investigates whether diversification is helpful in realizing the financial objective of microfinance. Like banks, MFIs should be able to generate profit or at least break-even. Thus, this paper focuses on the sustainability and profitability of MFIs. We use two indicators for each financial dimension. That is, we use OSS and FSS as sustainability indicators and ROA and ROE as profitability measures. OSS is operational self-sustainability, a ratio that demonstrates the ability of MFIs to be fully sustainable in the long-run, in the sense that they can cover all their operating costs and maintain the value of their capital. The operational self-sustainability ratio is a better measure of financial performance than standard financial ratios, such as return on assets or equity, because it entails a more complete list of inputs and outputs. FSS is

financial self-sustainability (explained below). ROA (return on assets) and ROE (returns on equity) are traditional measures for financial performance, in different fields, not only in microfinance. Overall, OSS, FSS, ROA and ROE have been widely used to measure the financial performance of MFIs (Cull, Demirgüç-Kunt, and Morduch 2007, 2011, Mersland and Strøm 2009, Armendáriz and Morduch 2010, Adusei, Akomea, and Poku 2017, Dorfleitner, Priberny, and Röhe 2017, Abdullah and Quayes 2016).

ROA is a ratio of net operating income of the MFI divided by average assets. This ratio allows a comparison of an MFI's performance to those of other MFIs or to the industry benchmark. OSS measures the ability of an MFI to cover its operating costs from operating revenue. It is computed as follows.

$$OSS = \frac{Operating\ revenue}{Costs\ on\ (funding + loan\ loss\ provision + operations)} \qquad (2)$$

Where operating revenue consists of interest and non-interest income. Funding cost is the cost of borrowings (interest and fees on loans and bonds), loan loss provision is the amount set aside to cover costs of loans default, and operations refer to cost of operations and include staff and non-staff costs. If OSS is 1 or 100 percent means full operational self-sufficiency. A value less than 1 means that the MFI needs to rely on external funding to meet operational costs while a value greater 1 indicates the MFI can do without subsidies; it is "self-sufficient."

Note that the computations of both operating revenue and operating costs include subsidies enjoyed by some MFIs, hence, they are not intrinsic or market values. FSS deals with subsidies from "soft" loans and investments, calculated as:

$$FSS = \frac{Operating\ revenue}{Adjusted\ costs\ on\ (funding + loan\ loss\ provision + operations)} \qquad (3)$$

FSS adjusts operating revenue and costs to reflect how sustainable an MFI is if its operations were unsubsidized and its borrowings were at arm's length transactions. It is important to make subsidy adjustments since MFIs are heterogeneous in terms of the amount of subsidy received. These adjustments allow better comparison among MFIs. Additionally, subsidy adjustments allow us to get an object picture of the true financial sustainability of an MFI since they operate on commercial basis. Overall, FSS seeks to answer the question: can an MFI continue to operate in the near future without subsidy?

There are three types of subsidy adjustments: concessionary borrowings, in-kind donations, and cash donations (Mersland and Strøm 2014, Armendáriz and Morduch 2010). The first concerns adjustment to funding costs and it takes into account the difference subsidized funding costs and unsubsidized funding costs. This difference is added back to funding costs. The second adjustment captures donations in-kind or where raw materials were donated or supplied below market cost. Cash donations adjustment also capture monies given to the institution at no cost. This should be deducted from operating revenue.

Control variables

MFI size. As in other empirical studies [e.g., Mersland and Strøm (2009); Sanya and Wolfe (2010)] we take the natural log of total assets to control for MFI size since there are scale economies in microfinance (Hartarska, Shen, and Mersland 2013). It is possible that diversification benefits could be related to large size since larger firms are able to diversify better than smaller ones (Demsetz and Strahan 1997, Gulamhussen, Pinheiro, and Pozzolo 2014).

Capital/Asset. This ratio measures the ability of the institutions to withstand shocks. Institution's probability of failure depends on its level of capitalization, larger capitals are safer (Lehar 2005).

Loan/Asset. This ratio, gross loan portfolio to total assets, measures differences in MFIs loan portfolios. Financial institutions with larger loan assets may focus more on interest activities compared with non-interest activities as far as income diversification is concerned (Stiroh and Rumble 2006). Moreover, high switching costs in lending relationships tends to stabilize interest income (DeYoung and Roland 2001).

MFI experience. Age controls for differences in experience across MFIs. Learning curve theory suggests that the older you are, the better experienced you become. Thus, well-established MFIs are more likely to perform better than less experienced MFIs as they already have established relationships with customers, suppliers, and other stakeholders. MFI age has been used as a control variable in other empirical studies [e.g., Pascal, Mersland, and Mori (2017); Hermes, Lensink, and Meesters (2011)]

Portfolio at risk (PaR30). PaR30 is the proportion of gross loan portfolio that is in arrears over days. This is a widely used measure of portfolio quality in microfinance as most loans are short-term in nature. Other empirical studies have used this measure as control variable [e.g. Mersland and Strøm (2009); D'Espallier, Guerin, and Mersland (2011)].

Regulation. Some MFIs in our sample are regulated by banking authorities. Regulated MFIs stand the chance of gaining greater reputation leading to high customer loyalty. The bottom line is improved performance (Mersland and Strøm 2009). However, costs of regulation such as security requirement cost may reduce the amount of resources available for innovations. Accordingly, costs associated with regulation may offset the benefits (Hardy, Holden, and Prokopenko 2003). In sum, regulatory policies concerning activity restrictions, diversification requirements, and institutional environment may affect benefits associated with diversification (Mercieca, Schaeck, and Wolfe 2007).

Geographical area. We also control for the geographical areas within which the MFIs operate. In our sample, some MFIs serve only urban clients and others focus on only rural clients. In the analysis, the latter category is left out for reasons of singularity.

Lending methodology. MFIs adopt three different lending methodologies when it comes to the supply of microcredit namely solidarity group, individual and village banking. Solidarity group lending is an important innovation of microfinance regarding the repayment of credits (Hulme and Mosley 1996, Morduch 1999). It enhances the repayment rates due to peer pressure from other group members (Ledgerwood 1999). In the empirical analysis, the first two dummies are included while village banking serves as the reference category.

Finally, the paper controls for other country specific characteristics including GDP (gross domestic product) per capita adjusted for purchasing power parity (constant 2011 international $) and annual GDP growth rate, following Sanya and Wolfe (2010) approach. Additionally, we control for inflation – consumer price index. Table 1 summarizes the variables defined above.

[Insert Table 1 about here]

3.3 Estimation approach

This paper employs fixed effects model to account for any important variables omitted (Wooldridge 2011). In particular, the paper takes into account any unobserved firm-specific effects across MFIs. Our basic regression model is expressed as follows.

$$y_{it} = \beta_0 + \beta_1 DIV_{it} + \gamma X_{it} + C_i + u_{it} \tag{4}$$

Where y_{it} is a vector of dependent variables, DIV is the diversification index for revenue, β_0 is the mean of unobserved heterogeneity, β₁ and γ are coefficients, X_{it} constitutes the controls for size, experience, loan quality, level of capital, loan to asset ratio, location of market, lending method,

GDP per person, and GDP growth rate. C_i is firm-specific unobserved effect and u_{it} is the remaining error term that varies across both t and i. The main advantage of using fixed effects estimator is that, it wipes out all of the firm-specific unobserved effects (C_i's).

To determine whether our estimation method is appropriate for the data, we first check whether panel techniques are more appropriate than ordinary least squares (OLS) by applying the Breusch-Pagan test (Greene 2003). If the test rejects the null hypothesis, then the random effects model (RE) is preferable. The results (Table A2 in Appendix) show that RE model is appropriate. Second, we test the assumed correlation between MFI-specific effects and regressors using Hausman's (1978) specification test. A rejection of the null hypothesis in the specification test shows that MFI-specific effects correlate with regressors, such that a fixed effects model is preferable, which is the case in this study (see Table A2). Only in two models (using ROA as dependent) out of eight models, the RE estimator is desirable. However, to be consistent, we use the fixed effects (FE) estimator for all models. Moreover, when we compare the results of the two models (involving ROA) between FE and RE[1] and see that they are not substantially different from each other.

4. Results and discussion

4.1 Descriptive statistics, correlations and variance inflation factor scores

Table 2 presents the descriptive statistics of the variables used in our estimations. *DIV* has a mean value of 0.13 indicating relatively small degree of diversification across non-interest revenue sources. On average, about eight percent of MFI's total revenue is from non-interest sources such as commissions and fees (*Share-non*). Concerning the dependent variables, ROA has a mean value of 2.60 percent and that of ROE is 8.20 percent. These profitability means are quite low, suggesting

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[1] The random effects results are not reported but are available upon request.

that MFIs are not purely profit oriented firms. What is important for them is self-sustainability, which is the case in this sample as OSS is above one (1.104), indicating that MFIs can cover their operational costs from revenue earned. However, the mean value of FSS less than one (0.952) suggests that MFIs cannot survive in the long-run without subsidies from governments and other advocates of financial inclusion.

[Insert Table 2 about here]

Regarding the control variables, on average, an MFI has eleven years of experience with thirty-seven percent of total assets funded by equity. The average portfolio at risk (Par30) is five percent. A large proportion (seventy-five percent) of total assets are loans. This makes sense, since microfinance mission is to supply financial services to poor families and microenterprises. In terms of geographical focus, twenty-seven percent of MFIs in the sample serve urban clients and with respect to their lending methodologies, about twenty-six percent of MFIs offer solidarity group loans while fifty-seven percent offer individual loans.

Furthermore, on average, gross domestic product (GDP) experiences an annual growth rate of about five percent over the eighteen-year period. Similarly, inflation has a mean of about six percent. Finally, about thirty-six percent of MFIs are regulated by banking authorities.

Table 3 presents pairwise correlations and variance inflation factor (VIF) scores among the regressors, which provide information concerning multicollinearity problem. Many correlations are significant at one percent level of significance. The correlations do not indicate severity of multicollinearity problem because all of them (except the one between DIV and Share-non) are less than suggested threshold of 0.70 (Kennedy 2008). The correlation between DIV and Share-non is quite high (0.96) because they mean the same thing in different measurements. Therefore, we do not include both in a model. An alternative and a common approach to detect severity of multicollinearity between explanatory variables is the use of VIF score (Studenmund 2011). The

rule of thumb is to have VIF values lower than five (Studenmund 2011) or ten (Gujarati 2011, Hair et al. 2010) in order to conclude absence of severe multicollinearity problem. Accordingly, our test for VIF indicates that all values are less than five, the highest is 2.02 (individual lending). This suggests that multicollinearity problem is not severe in this study.

[Insert Table 3 about here]

4.2 Fixed effects regression results

To estimate equation (4), we employ the specific-to-general model-building approach as follows (Koopmans 1937, Brooks 2008). For each dependent variable, we run four models. In the first model, the dependent variable is regressed on only the diversification variable (DIV). Then in the second model, we add only MFI-specific controls while the third model adds macroeconomic indicators. In the fourth model, industry regulation control is included. The reason for this systematic approach is to detect any sensitivity issues and to establish some level of robustness of the results. Finally, for comparison and convenience purposes, we then report all the dependent variables in one table (Table A2 in the Appendix).

Table 4 presents the regression results of the link between revenue diversification and sustainability of MFIs. In models (1) to (4), the dependent variables is operational self-sustainability while models (5) to (8) relate to financial self-sustainability. Thus, both variables are sustainability measures. As expected, the R-squared improves with respect to the systematic approach from 0.10 percent in model (5) to 28.80 percent in model (8). The coefficient of DIV is positive in seven out of eight models indicating that revenue diversification comes with improved sustainability. This suggests that MFIs could be more sustainable by having several non-interest revenue generating activities. The finding (DIV) is however not significant in seven models.

[Insert Table 4 about here]

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Concerning the control variables, the coefficient of MFI size is positive and significant in all models, confirming scale economies in microfinance (Hartarska, Shen, and Mersland 2013). We also observe that MFI experience reduces operational self-sustainability. This is in contrast to learning curve theory. Probably, younger MFIs leapfrog older ones in terms of current efficiency practices, which older MFIs may have to learn by trial and error means (Hermes, Lensink, and Meesters 2011). As expected, portfolio at risk has negative impact on sustainability and it is significant in all models. Increase in non-performing loans requires more efforts in monitoring, leading to increased operational costs associated with monitoring (Berger & DeYoung, 1997).

Furthermore, equity and loan portfolio as proportions of total assets have significant positive effects on sustainability. As expected, group lending improves operational sustainability. However, it reduces financial sustainability. It is also observed that, serving urban clients increases MFIs' sustainability, perhaps, costs of doing business with them are lower compared to rural clients. As expected, both GDP indicators are significant, suggesting that a healthy economy increases the sustainability of MFIs. However, increase in inflation reduces MFIs' sustainability. Finally, regulation is found to have a negative impact on sustainability. This finding concurs with the argument that costs of regulations may outweigh its benefits (Hardy, Holden, and Prokopenko 2003).

Table 5 reports the FE regression results on the effects of revenue diversification on financial performance in terms of profitability (ROA and ROE). This time, DIV is significant in four models with control variables included. This suggests that MFIs' profitability could be improved if they have many other sources of revenue aside interest revenue. With respect to the control variables, the findings are not significantly different from those in Table 4.

[Insert Table 5 about here]

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For robustness checks, we replace DIV with the ratio of non-interest revenue to total revenue (Share-non) as the independent variable and repeat all the regressions discussed above. The results are presented in Tables 6 and 7. *Share-non* is highly significant with the same positive coefficients in majority of the models. Thus, the additional results provide strong evidence that revenue diversification increases the financial performance of microfinance institutions.

[Insert Tables 6 and 7 about here]

Finally, for easy comparison of the results with the different dependent variables used, Table A2 presents a summary. The table contains only models with all the controls. Overall, revenue diversification (DIV/Share-non) has a significant positive relationship with performance indicators supporting hypothesis 1. This suggests that MFIs may at least break-even when they have multiple revenue sources apart from interest revenue.

5. Conclusion

The academic literature presents two conflicting theories about the extent to which financial institutions could expand their operations. Modern portfolio and banking theories suggest diversification premium while agency theory argues that it is value destroying for a firm to diversify. Thus, it is better to focus in order to reduce agency costs. However, since there is empirical evidence supporting each view, the question this study asks is, which view is appropriate for microfinance institutions?

Thus, this paper investigates the effects of revenue diversification on the financial performance of MFIs. Using fixed effects estimator, we find evidence that diversification premium exists for microfinance institutions. Precisely, diversification across revenue streams improves both sustainability and profitability of MFIs.

The findings imply that microfinance practitioners could expand and sustain their revenue generating activities in order to take advantage of diversification benefits. Once an institution is self-sustainable, it is in a better position to meet its core objective of financial inclusion since more resources could be amassed to effectively serve poor people.

A limitation for this paper is that, since the data is based on rating reports, there can be self-selection bias as MFIs that chose to be rated are those included in the sample. In order to access external funding, MFIs may choose to be rated and in the process, they might massage some information just be included in the rating assessment. Thus, self-section could be correlated with the decision to diversify or focus. Therefore, it would be interesting to replicate this study with international evidence from unrated MFIs or a mixed of rated and unrated MFIs.

Acknowledgement

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Table 1: Variables definitions

Variable	Definition
Diversification	
DIV	Revenue diversification index, defined in equation (1)
Share-non	Non-interest revenue as a proportion of total revenue
Financial performance	
Returns on assets (ROA)	Net operating income divided by average assets
Returns on equity (ROE)	Net income divided by equity
OSS	Operational self-sustainability, defined in equation (2)
FSS	Financial self-sustainability, defined in equation (3)
Control variables	
MFI size	Natural logarithm of total assets
MFI experience	The number years an institution is in operation
Portfolio at Risk (PaR30)	Proportion of loan portfolio in arrears over 30 days.
Equity to asset ratio	Total equity over total assets
Loan to asset ratio	Gross loan portfolio over total assets
Urban market	1= MFI emphasizes urban areas as main market 0= otherwise
Group lending	1 = if MFI adopts group lending method, 0 = otherwise
Individual lending	1 = if individual lending method, 0 = otherwise
GDP per person	Gross domestic product per capita adjusted for purchasing power parity (constant 2011 international $)
GDP growth	Annual gross domestic product percentage growth rate
Inflation	Annual consumer price index
Regulation	Regulation is a dummy variable and takes the value of 1 if the institution is regulated banking authorities and 0 otherwise.

Table 2: Descriptive statistics of variables

Variable	Mean	S.D.	Min	Max	Obs.
Operational self-sustainability (OSS)	1.104	0.315	0.076	1.977	1574
Financial self-sustainability (FSS)	0.952	0.298	0.064	3.469	1562
Returns on assets (ROA)	0.026	0.074	-0.298	0.293	3030
Returns on equity (ROE)	0.082	0.208	-0.887	0.862	2908
Diversification index (DIV)	0.130	0.135	-0.473	0.500	3167
Non-interest revenue (share-non)	0.081	0.105	-0.296	0.599	3122
Total assets in logarithm (MFI size)	15.297	1.642	4.871	20.923	3248
Age of MFI in years (MFI experience)	10.892	7.584	0.000	52.000	3268
Portfolio at risk over 30 days (Par30)	0.054	0.067	-0.271	0.398	2949
Equity to assets ratio (Equity)	0.369	0.273	-1.571	1.000	3216
Loan portfolio to assets ratio (Loan)	0.745	0.170	0.008	0.999	3167
Urban market	0.266	0.442	0.000	1.000	2641
Group lending (Group)	0.255	0.436	0.000	1.000	2855
Individual lending (Individual)	0.573	0.495	0.000	1.000	2855
GDP growth (%)	5.121	3.260	-14.150	14.722	3253
GDP per person (log)	8.446	0.892	6.307	10.544	3288
Inflation	0.064	0.051	-0.185	0.287	2298
Regulation	0.363	0.481	0.000	1.000	2913

S.D. = standard deviation

Table 3: Pairwise correlation matrix and VIF scores

	VIF	1	2	3	4	5	6	7	8	9	10	11	12	13
1. DIV	1.20	1.0000												
2. Share-non	1.16	0.9634*	1.0000											
3. MFI size	1.41	0.0077	0.0043	1.0000										
4. MFI experience	1.30	0.0923*	0.0740*	0.3591*	1.0000									
5. Par30	1.22	0.2139*	0.2022*	-0.0792*	0.1458*	1.0000								
6. Equity/asset	1.14	-0.1270*	-0.1197*	-0.1123*	-0.0701*	-0.1108*	1.0000							
7. Loan/asset	1.16	-0.3616*	-0.3411*	0.1208*	0.0428	-0.1895*	0.0176	1.0000						
8. Urban	1.11	-0.0223	-0.0284	-0.0440	-0.0796*	0.0496	0.0601	0.0233	1.0000					
9. Group	1.83	-0.0555	-0.0497	-0.2154*	-0.1525*	-0.0882*	0.0240	-0.0869*	-0.0347	1.0000				
10. Individual	2.02	0.1184*	0.1092*	0.2417*	0.1426*	0.1488*	-0.0705	0.0558	0.1479*	-0.6784*	1.0000			
11. GDP growth	1.08	-0.1051*	-0.0993*	-0.1197*	-0.0628	-0.1124*	0.0637	0.0818*	-0.0720	0.1044*	-0.0843*	1.0000		
12. GDP per person	1.20	-0.1156*	-0.1013*	0.1924*	0.0691*	-0.0645	0.0315	0.2068*	0.0956*	-0.2183*	0.2216*	-0.2042*	1.0000	
13. Inflation	1.05	0.0577	0.0521	-0.0608	-0.0320	-0.0490	-0.0188	-0.0345	0.0202	0.0556	-0.0247	0.1229*	-0.1068*	1.0000
14. Regulation	1.28	0.0776*	0.0665	0.2334*	0.0089	0.0128	-0.1500*	-0.0605	-0.0967*	-0.0332	0.1646*	0.0702	-0.2406*	-0.0537

Notes: VIF = Variance inflation factor. * Denotes statistical significance at the 1 percent level

Table 4: Effects of revenue diversification on sustainability of microfinance institutions

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Operational self-sustainability				Financial self-sustainability			
DIV	0.1151*	0.0298	0.0965	0.1116	0.0666	-0.0496	0.0181	0.0296
	(0.0653)	(0.0730)	(0.0763)	(0.0763)	(0.0659)	(0.0653)	(0.0686)	(0.0684)
MFI size		0.1314***	0.1040***	0.1099***		0.1408***	0.1330***	0.1389***
		(0.0162)	(0.0201)	(0.0201)		(0.0157)	(0.0187)	(0.0188)
MFI experience		-0.0129**	-0.0158**	-0.0143**		-0.0050	-0.0089	-0.0072
		(0.0053)	(0.0066)	(0.0066)		(0.0049)	(0.0060)	(0.0060)
Portfolio at risk		-0.9335***	-0.9313***	-0.8534***		-0.7150***	-0.9082***	-0.8061***
		(0.1723)	(0.1860)	(0.1891)		(0.1564)	(0.1684)	(0.1705)
Equity/assets		0.1742***	0.2271***	0.2229***		0.0793	0.1098**	0.1072**
		(0.0499)	(0.0564)	(0.0563)		(0.0483)	(0.0535)	(0.0532)
Loan/assets		0.3024***	0.2959***	0.2749***		0.2717***	0.2183***	0.2045***
		(0.0746)	(0.0755)	(0.0757)		(0.0631)	(0.0636)	(0.0634)
Urban market		0.1222***	0.0822	0.0740		0.2582***	0.2205***	0.2110***
		(0.0470)	(0.0531)	(0.0531)		(0.0410)	(0.0478)	(0.0477)
Group lending		0.2029*	0.1666	0.1521		-0.1785*	-0.2530**	-0.2647**
		(0.1101)	(0.1172)	(0.1171)		(0.1050)	(0.1088)	(0.1083)
Individual lending		-0.0284	-0.0947	-0.0766		-0.0816	-0.1375*	-0.1146
		(0.0726)	(0.0818)	(0.0819)		(0.0728)	(0.0766)	(0.0766)
GDP growth			0.0041	0.0038			0.0053**	0.0051**
			(0.0026)	(0.0026)			(0.0024)	(0.0024)
GDP per person			0.3392***	0.3686***			0.1401	0.1734
			(0.1238)	(0.1240)			(0.1140)	(0.1139)
Inflation			-0.1805	-0.1678			-0.7478***	-0.7559***
			(0.1749)	(0.1745)			(0.1623)	(0.1616)
Regulation				-0.1123***				-0.1197***
				(0.0424)				(0.0391)
Constant	1.0888***	-1.0638***	-3.4829***	-3.7968***	0.9438***	-1.3057***	-2.2214**	-2.5759***
	(0.0103)	(0.2287)	(0.9736)	(0.9780)	(0.0104)	(0.2237)	(0.8967)	(0.8996)
Observations	1,526	1,112	908	903	1,526	1,124	936	931

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Number of MFIs	386	343	272	270	384	347	284	282
R-squared	0.003	0.180	0.200	0.209	0.001	0.256	0.277	0.288

Notes: This table lists fixed effects regression results where *OSS* and FSS are regressed on *DIV* with(out) controls. *OSS* is operational self-sustainability (models 1 to 4), FSS is financial self-sustainability (models 4 to 8) and *DIV* is an indicator for revenue diversification. *MFI size* is the natural logarithm of total assets, *MFI experience* is number of years the institution has operated as an MFI, *Portfolio at Risk* is proportion of loan portfolio in arrears over 30 days, *Equity/Assets* is the ratio of equity to total assets, *Loan/Assets* is the ratio of loans to total assets, and *Urban market =1 if MFI emphasizes urban areas as* main market, 0 = otherwise. *Group lending* = 1 if MFI adopts solidarity group lending method, 0= otherwise, and *individual lending* = 1 if individual loans are offered, 0= otherwise. *GDP per person* is the country's Gross Domestic Product per person (in log) and *GDP growth* is the annual growth rate of Gross Domestic Product. *Inflation* is the annual consumer price index and *Regulation* is a dummy variable, which takes the value of 1 if the institution is regulated by banking authorities and 0 otherwise. Standard errors are in parentheses.

*, **, *** denotes statistical significance at the 10 percent, 5 percent and 1 percent level respectively

Table 5: Effects of revenue diversification on profitability of microfinance institutions

Variables	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Returns on assets				Returns on equity			
DIV	-0.0082	0.0147	0.0313*	0.0287*	0.0362	0.0810**	0.0761*	0.0708
	(0.0129)	(0.0145)	(0.0160)	(0.0163)	(0.0359)	(0.0407)	(0.0459)	(0.0464)
MFI size		0.0137***	0.0152***	0.0162***		0.0532***	0.0532***	0.0546***
		(0.0031)	(0.0038)	(0.0039)		(0.0088)	(0.0108)	(0.0109)
MFI experience		-0.0009	-0.0011	-0.0010		-0.0064**	-0.0067*	-0.0068*
		(0.0009)	(0.0012)	(0.0012)		(0.0026)	(0.0034)	(0.0035)
Portfolio at risk		-0.1827***	-0.2196***	-0.2222***		-0.7218***	-0.9139***	-0.9239***
		(0.0303)	(0.0352)	(0.0355)		(0.0825)	(0.0977)	(0.0987)
Equity/assets		0.0546***	0.0483***	0.0483***		0.0021	0.0231	0.0270
		(0.0093)	(0.0106)	(0.0108)		(0.0274)	(0.0306)	(0.0311)
Loan/assets		0.0867***	0.0762***	0.0757***		0.1764***	0.1585***	0.1594***
		(0.0135)	(0.0149)	(0.0151)		(0.0383)	(0.0423)	(0.0429)
Urban market		0.0092	0.0138*	0.0145*		0.0431**	0.0337	0.0339
		(0.0070)	(0.0083)	(0.0084)		(0.0198)	(0.0240)	(0.0241)
Group lending		0.0140	-0.0048	-0.0014		0.0646	0.0469	0.0475
		(0.0174)	(0.0204)	(0.0206)		(0.0493)	(0.0568)	(0.0573)
Individual lending		0.0027	-0.0172	-0.0129		0.0237	0.0028	0.0031
		(0.0159)	(0.0188)	(0.0191)		(0.0458)	(0.0522)	(0.0529)
GDP growth			0.0014***	0.0013**			0.0018	0.0018
			(0.0005)	(0.0005)			(0.0014)	(0.0014)
GDP per person			0.0029	0.0085			0.0474	0.0433
			(0.0249)	(0.0253)			(0.0691)	(0.0704)
Inflation			-0.0011	-0.0063			-0.1054	-0.1127
			(0.0339)	(0.0343)			(0.0951)	(0.0962)
Regulation				-0.0149*				0.0007
				(0.0088)				(0.0246)
Constant	0.0278***	-0.2569***	-0.2869	-0.3490*	0.0796***	-0.8107***	-1.1806**	-1.1698**
	(0.0019)	(0.0439)	(0.1977)	(0.2020)	(0.0053)	(0.1279)	(0.5503)	(0.5619)
Observations	2,956	2,163	1,674	1,648	2,841	2,088	1,634	1,609

Number of case	591	515	421	417	549	484	410	405
R-squared	0.000	0.083	0.102	0.107	0.000	0.103	0.134	0.137

Notes: This table lists fixed effects regression results where *ROA* and ROE are regressed on *DIV* with(out) controls. *ROA* is returns on assets (models 9 to 12), ROE is returns on equity (models 13 to 16) and *DIV* is an indicator for revenue diversification. *MFI size* is the natural logarithm of total assets, *MFI experience* is number of years the institution has operated as an MFI, *Portfolio at Risk* is proportion of loan portfolio in arrears over 30 days, *Equity/Assets* is the ratio of equity to total assets, *Loan/Assets* is the ratio of loans to total assets, and *Urban market =1 if MFI emphasizes urban areas as* main market, 0 = otherwise. *Group lending* = 1 if MFI adopts solidarity group lending method, 0= otherwise, and *individual lending* = 1 if individual loans are offered, 0= otherwise. *GDP per person* is the country's Gross Domestic Product per person (in log) and *GDP growth* is the annual growth rate of Gross Domestic Product. *Inflation* is the annual consumer price index and *Regulation* is a dummy variable, which takes the value of 1 if the institution is regulated by banking authorities and 0 otherwise. Standard errors are in parentheses.

*, **, *** denotes statistical significance at the 10 percent, 5 percent and 1 percent level respectively

Table 6: Effects of revenue diversification on sustainability of microfinance institutions

Variables	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
	Operational self-sustainability				Financial self-sustainability			
Share-non	0.1472*	0.0757	0.1653*	0.1783*	0.1069	-0.0395	0.0301	0.0385
	(0.0822)	(0.0923)	(0.0979)	(0.0978)	(0.0828)	(0.0838)	(0.0894)	(0.0891)
MFI size		0.1316***	0.1026***	0.1084***		0.1405***	0.1332***	0.1392***
		(0.0162)	(0.0201)	(0.0202)		(0.0157)	(0.0188)	(0.0188)
MFI experience		-0.0135**	-0.0165**	-0.0150**		-0.0046	-0.0086	-0.0067
		(0.0053)	(0.0066)	(0.0066)		(0.0049)	(0.0060)	(0.0060)
Portfolio at risk		-0.9563***	-0.9650***	-0.8883***		-0.7324***	-0.9403***	-0.8347***
		(0.1736)	(0.1873)	(0.1908)		(0.1569)	(0.1692)	(0.1714)
Equity/assets		0.1710***	0.2230***	0.2196***		0.0830*	0.1114**	0.1100**
		(0.0500)	(0.0565)	(0.0564)		(0.0484)	(0.0535)	(0.0532)
Loan/assets		0.3064***	0.3015***	0.2803***		0.2565***	0.1981***	0.1812***
		(0.0746)	(0.0755)	(0.0758)		(0.0640)	(0.0648)	(0.0647)
Urban market		0.1257***	0.0877	0.0794		0.2613***	0.2284***	0.2192***
		(0.0471)	(0.0533)	(0.0533)		(0.0410)	(0.0478)	(0.0477)
Group lending		0.1987*	0.1645	0.1507		-0.1812*	-0.2575**	-0.2696**
		(0.1105)	(0.1173)	(0.1172)		(0.1049)	(0.1087)	(0.1081)
Individual lending		-0.0330	-0.0971	-0.0797		-0.0841	-0.1400*	-0.1170
		(0.0732)	(0.0820)	(0.0820)		(0.0729)	(0.0766)	(0.0766)
GDP growth			0.0043*	0.0039			0.0059**	0.0056**
			(0.0026)	(0.0026)			(0.0024)	(0.0024)
GDP per person			0.3497***	0.3776***			0.1475	0.1809
			(0.1240)	(0.1242)			(0.1139)	(0.1138)
Inflation			-0.1844	-0.1713			-0.6963***	-0.6975***
			(0.1749)	(0.1747)			(0.1653)	(0.1645)
Regulation				-0.1077**				-0.1204***
				(0.0425)				(0.0391)
Constant	1.0924***	-1.0596***	-3.5422***	-3.8428***	0.9436***	-1.2970***	-2.2795**	-2.6370***
	(0.0088)	(0.2293)	(0.9743)	(0.9791)	(0.0089)	(0.2239)	(0.8960)	(0.8988)
Observations	1,513	1,108	905	900	1,515	1,119	932	927
Number of case	385	343	273	271	383	346	284	282

R-squared	0.003	0.181	0.202	0.211	0.001	0.258	0.280	0.291

Notes: This table lists fixed effects regression results where *OSS* and FSS are regressed on *Share-non* with(out) controls. *OSS* is operational self-sustainability (models 17 to 20), FSS is financial self-sustainability (models 21 to 24) and *Share-non* is a ratio of non-interest revenue to total revenue. *MFI size* is the natural logarithm of total assets, *MFI experience* is number of years the institution has operated as an MFI, *Portfolio at Risk* is proportion of loan portfolio in arrears over 30 days, *Equity/Assets* is the ratio of equity to total assets, *Loan/Assets* is the ratio of loans to total assets, and *Urban market =1 if MFI emphasizes urban areas as main market*, 0 = otherwise. *Group lending* = 1 if the MFI adopts solidarity group lending method, 0= otherwise, and *individual lending* = 1 if individual loans are offered, 0= otherwise. *GDP per person* is the country's Gross Domestic Product per person (in log) and *GDP growth* is the annual growth rate of Gross Domestic Product. *Inflation* is the annual consumer price index and *Regulation* is a dummy variable, which takes the value of 1 if the institution is regulated by banking authorities and 0 otherwise. Standard errors are in parentheses.

*, **, *** denotes statistical significance at the 10 percent, 5 percent and 1 percent level respectively

Table 7: Effects of revenue diversification on profitability of microfinance institutions

Variables	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)
	Returns on assets				Returns on equity			
Share-non	-0.0061	0.0276	0.0452**	0.0424**	0.0240	0.1125**	0.1244**	0.1195**
	(0.0171)	(0.0190)	(0.0209)	(0.0212)	(0.0473)	(0.0537)	(0.0602)	(0.0607)
MFI size		0.0148***	0.0155***	0.0165***		0.0527***	0.0551***	0.0566***
		(0.0031)	(0.0038)	(0.0039)		(0.0088)	(0.0109)	(0.0110)
MFI experience		-0.0013	-0.0013	-0.0013		-0.0066**	-0.0074**	-0.0074**
		(0.0009)	(0.0012)	(0.0012)		(0.0026)	(0.0034)	(0.0035)
Portfolio at risk		-0.1677***	-0.2078***	-0.2104***		-0.6912***	-0.9014***	-0.9118***
		(0.0302)	(0.0348)	(0.0351)		(0.0837)	(0.0975)	(0.0985)
Equity/assets		0.0540***	0.0444***	0.0445***		-0.0020	0.0167	0.0207
		(0.0092)	(0.0104)	(0.0106)		(0.0274)	(0.0305)	(0.0309)
Loan/assets		0.0999***	0.0862***	0.0861***		0.1971***	0.1770***	0.1787***
		(0.0136)	(0.0150)	(0.0152)		(0.0390)	(0.0430)	(0.0436)
Urban market		0.0116*	0.0172**	0.0179**		0.0482**	0.0403*	0.0405*
		(0.0069)	(0.0082)	(0.0083)		(0.0197)	(0.0239)	(0.0240)
Group lending		0.0135	-0.0061	-0.0026		0.0610	0.0441	0.0447
		(0.0172)	(0.0201)	(0.0203)		(0.0492)	(0.0565)	(0.0570)
Individual lending		0.0020	-0.0181	-0.0139		0.0210	-0.0009	-0.0007
		(0.0158)	(0.0185)	(0.0188)		(0.0458)	(0.0519)	(0.0526)
GDP growth			0.0014***	0.0012**			0.0017	0.0016
			(0.0005)	(0.0005)			(0.0014)	(0.0014)
GDP per person			0.0018	0.0071			0.0413	0.0368
			(0.0245)	(0.0250)			(0.0688)	(0.0701)
Inflation			-0.0201	-0.0254			-0.1329	-0.1409
			(0.0337)	(0.0341)			(0.0954)	(0.0965)
Regulation				-0.0146*				0.0005
				(0.0087)				(0.0245)
Constant	0.0269***	-0.2814***	-0.2845	-0.3441*	0.0821***	-0.8154***	-1.1606**	-1.1480**
	(0.0017)	(0.0437)	(0.1946)	(0.1987)	(0.0046)	(0.1282)	(0.5470)	(0.5584)
Observations	2,921	2,141	1,664	1,638	2,808	2,066	1,624	1,599
Number of MFIs	590	513	420	416	548	482	409	404

R-squared	0.000	0.089	0.104	0.110	0.000	0.101	0.137	0.140

Notes: This table lists fixed effects regression results where *ROA* and ROE are regressed on *Share-non* with(out) controls. *ROA* is returns on assets (models 25 to 28), ROE is returns on equity (models 29 to 32) and *Share-non* is a ratio of non-interest revenue to total revenue. *MFI size* is the natural logarithm of total assets, *MFI experience* is number of years the institution has operated as an MFI, *Portfolio at Risk* is proportion of loan portfolio in arrears over 30 days, *Equity/Assets* is the ratio of equity to total assets, *Loan/Assets* is the ratio of loans to total assets, and *Urban market =1 if MFI emphasizes urban areas as* main market, 0 = otherwise. *Group lending* = 1 if MFI adopts solidarity group lending method, 0= otherwise, and *individual lending* = 1 if individual loans are offered, 0= otherwise. *GDP per person* is the country's Gross Domestic Product per person (in log) and *GDP growth* is the annual growth rate of Gross Domestic Product. *Inflation* is the annual consumer price index and *Regulation* is a dummy variable, which takes the value of 1 if the institution is regulated by banking authorities and 0 otherwise. Standard errors are in parentheses.

*, **, *** denotes statistical significance at the 10 percent, 5 percent and 1 percent level respectively

Appendix

Table A1: Distribution of number of microfinance institutions by country

#	Country	No. of MFIs	#	Country	No. of MFIs	#	Country	No. of MFIs	#	Country	No. of MFIs
1	Albania	3	27	Kyrgyz Republic	9	53	Nepal	5	79	Comoros	1
2	Argentina	2	28	Madagascar	3	54	Vietnam	4	80	Italy	3
3	Armenia	6	29	Mali	11	55	Azerbaijan	9	81	Samoa	1
4	Benin	8	30	Mexico	31	56	Mongolia	4	82	Sierra Leone	1
5	Bolivia	17	31	Moldova	2	57	Nigeria	6	83	South Sudan	1
6	Bosnia & Herzegovina	12	32	Morocco	8	58	Mozambique	1	84	United Kingdom	1
7	Brazil	14	33	Nicaragua	14	59	Tajikistan	11	85	Yemen	1
8	Bulgaria	3	34	Pakistan	2	60	Croatia	1	86	Angola	1
9	Burkina Faso	9	35	Paraguay	2	61	Chad	3	87	Macedonia	1
10	Cambodia	14	36	Peru	40	62	Rwanda	12		**Total**	**607**
11	Chile	2	37	Philippines	22	63	Zambia	3			
12	Colombia	14	38	Romania	7	64	China	5			
13	Dominican Republic	7	39	Russia	17	65	Serbia	2			
14	Ecuador	20	40	Senegal	12	66	Ghana	5			
15	Egypt	6	41	South Africa	4	67	Malawi	2			
16	El Salvador	7	42	Sri Lanka	2	68	Gambia	1			
17	Ethiopia	10	43	Tanzania	8	69	Kosovo	5			
18	Georgia	8	44	Togo	5	70	Congo	1			
19	Guatemala	8	45	Trinidad and Tobago	1	71	Burundi	6			
20	Haiti	3	46	Tunisia	1	72	Niger	8			
21	Honduras	13	47	Uganda	25	73	Dem. Rep. Congo	1			
22	India	32	48	Montenegro	2	74	Afghanistan	2			
23	Indonesia	4	49	Cameroon	5	75	Costa Rica	3			
24	Jordan	3	50	Guinea	3	76	Lebanon	2			
25	Kazakhstan	8	51	Timor	1	77	Turkey	1			
26	Kenya	18	52	Bangladesh	2	78	Palestine	3			

Table A2: Effects of revenue diversification on financial performance of microfinance institutions

Variable	(1) OSS	(2) FSS	(3) ROA	(4) ROE	(5) OSS	(6) FSS	(7) ROA	(8) ROE
Share-non	0.1783*	0.0385	0.0424**	0.1195**				
	(0.0978)	(0.0891)	(0.0212)	(0.0607)				
DIV					0.1116	0.0296	0.0287*	0.0708
					(0.0763)	(0.0684)	(0.0163)	(0.0464)
MFI size	0.1084***	0.1392***	0.0165***	0.0566***	0.1099***	0.1389***	0.0162***	0.0546***
	(0.0202)	(0.0188)	(0.0039)	(0.0110)	(0.0201)	(0.0188)	(0.0039)	(0.0109)
MFI experience	-0.0150**	-0.0067	-0.0013	-0.0074**	-0.0143**	-0.0072	-0.0010	-0.0068*
	(0.0066)	(0.0060)	(0.0012)	(0.0035)	(0.0066)	(0.0060)	(0.0012)	(0.0035)
Portfolio at risk	-0.8883***	-0.8347***	-0.2104***	-0.9118***	-0.8534***	-0.8061***	-0.2222***	-0.9239***
	(0.1908)	(0.1714)	(0.0351)	(0.0985)	(0.1891)	(0.1705)	(0.0355)	(0.0987)
Equity/assets	0.2196***	0.1100**	0.0445***	0.0207	0.2229***	0.1072**	0.0483***	0.0270
	(0.0564)	(0.0532)	(0.0106)	(0.0309)	(0.0563)	(0.0532)	(0.0108)	(0.0311)
Loan/assets	0.2803***	0.1812***	0.0861***	0.1787***	0.2749***	0.2045***	0.0757***	0.1594***
	(0.0758)	(0.0647)	(0.0152)	(0.0436)	(0.0757)	(0.0634)	(0.0151)	(0.0429)
Urban market	0.0794	0.2192***	0.0179**	0.0405*	0.0740	0.2110***	0.0145*	0.0339
	(0.0533)	(0.0477)	(0.0083)	(0.0240)	(0.0531)	(0.0477)	(0.0084)	(0.0241)
Group lending	0.1507	-0.2696**	-0.0026	0.0447	0.1521	-0.2647**	-0.0014	0.0475
	(0.1172)	(0.1081)	(0.0203)	(0.0570)	(0.1171)	(0.1083)	(0.0206)	(0.0573)
Individual lending	-0.0797	-0.1170	-0.0139	-0.0007	-0.0766	-0.1146	-0.0129	0.0031
	(0.0820)	(0.0766)	(0.0188)	(0.0526)	(0.0819)	(0.0766)	(0.0191)	(0.0529)
GDP growth	0.0039	0.0056**	0.0012**	0.0016	0.0038	0.0051**	0.0013**	0.0018
	(0.0026)	(0.0024)	(0.0005)	(0.0014)	(0.0026)	(0.0024)	(0.0005)	(0.0014)
GDP per person	0.3776***	0.1809	0.0071	0.0368	0.3686***	0.1734	0.0085	0.0433
	(0.1242)	(0.1138)	(0.0250)	(0.0701)	(0.1240)	(0.1139)	(0.0253)	(0.0704)
Inflation	-0.1713	-0.6975***	-0.0254	-0.1409	-0.1678	-0.7559***	-0.0063	-0.1127
	(0.1747)	(0.1645)	(0.0341)	(0.0965)	(0.1745)	(0.1616)	(0.0343)	(0.0962)
Regulation	-0.1077**	-0.1204***	-0.0146*	0.0005	-0.1123***	-0.1197***	-0.0149*	0.0007
	(0.0425)	(0.0391)	(0.0087)	(0.0245)	(0.0424)	(0.0391)	(0.0088)	(0.0246)
Constant	-3.8428***	-2.6370***	-0.3441*	-1.1480**	-3.7968***	-2.5759***	-0.3490*	-1.1698**
	(0.9791)	(0.8988)	(0.1987)	(0.5584)	(0.9780)	(0.8996)	(0.2020)	(0.5619)

Observations	900	927	1,638	1,599	903	931	1,648	1,609
Number of MFIs	271	282	416	404	270	282	417	405
R-squared	0.211	0.291	0.110	0.140	0.209	0.288	0.107	0.137
Breusch test: p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman test: p-value	0.0000	0.0000	0.3217	0.0045	0.0000	0.0000	0.4303	0.0059

Notes: This table lists the results of fixed effects regression. *OSS* is operational self-sustainability, *FSS* is financial self-sustainability, *ROA* is returns on assets, *ROE* is returns on equity, *DIV* is an indicator for revenue diversification, and Share-non is a ratio of non-interest revenue to total revenue. *MFI size* is the natural logarithm of total assets, *MFI experience* is number of years the institution has operated as an MFI, *Portfolio at Risk* is proportion of loan portfolio in arrears over 30 days, *Equity/Assets* is the ratio of equity to total assets, *Loan/Assets* is the ratio of loans to total assets, and *Urban market =1 if MFI emphasizes urban areas as main market*, 0 = otherwise. *Group lending* = 1 if MFI adopts solidarity group lending method, 0= otherwise, and *individual lending* = 1 if individual loans are offered, 0= otherwise. *GDP per person* is the country's Gross Domestic Product per person (in log) and *GDP growth* is the annual growth rate of Gross Domestic Product. *Inflation* is the annual consumer price index and *Regulation* is a dummy variable, which takes the value of 1 if the institution is regulated by banking authorities and 0 otherwise. Standard errors are in parentheses.

*, **, *** denotes statistical significance at the 10 percent, 5 percent and 1 percent level respectively