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Can Investment in Microfinance Funds Improve Risk-Return Characteristics of a Portfolio?[#]

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ABSTRACT

This article is concerned with contribution of microfinance investment funds to a sustainable financial portfolio. With regard to the dependence of microfinance funds' returns on the performance of stock and fixed income markets in developed and emerging economies we find slightly negative correlation when measured by the portfolio beta measure. Our regression analysis confirms that returns on investment in microfinance investment funds exceed the returns on the market portfolio. This result together with reported near-to-zero beta estimates as a proxy for the systematic risk may be taken to be a clear financial advantage of an inclusion of microfinance assets in a portfolio compared to pure stock or bond portfolios. The results based on CAPM beta and Jensen`s alpha are confirmed by mean-variance spanning test too. We showthat the socially responsible investors may invest into microfinance without sacrifice with respect to pure financial indicators.

Keywords: Microfinance, Investment, Funds, Risk, Return, Mean-Variance Spanning
JEL classification: G11, G21

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1 Introduction

The emergence and successful development of microfinance are one of the most significant success stories of modern development economics. Microfinance institutions are active in provision of financial services (including small-sized loans, saving accounts or insurance products) to micro or small enterprises in developing and transition countries (Bauer et al., forthcoming). Sustainable development of microfinance institutions is crucially dependent on securing sufficient investment resources for their lending activities. The current trend of transformation and commercialization of microfinance results in an increasing number of more commercially viable microfinance institutions that are likely to attract foreign investors. According to Forster and Reille (2008), approximately half of all investment in microfinance from developed countries is channeled through specialized financial intermediaries that are collectively referred to as microfinance investment vehicles (MIVs).

MIV, which are foremost based in Western Europe or in the United States, serve as an intermediary between microfinance institutions and the final investor. They provide debt funding to microfinance institutions or directly acquire equity stakes in these lending institutions. While many investors choose to invest into MIV because of their socially responsible character, these investors also have to take into account the financial returns of their investment into MIV. The aim of this article is to analyze the attractiveness of such microfinance investment vehicles for institutional or individual investors from developed countries in terms of funds' return qualities as well as their risk diversification potential.

This paper concentrates on testing two hypotheses connected to risk and return characteristics of specialized microfinance investment vehicles (MIV) that directly or indirectly invest in microfinance institutions worldwide. Understanding what the risks of investing in microfinance are, what would an inclusion of microfinance assets in a broader portfolio result in and how important returns on such investment (in addition to their social impact) are, may help a growing number of investment funds with the dual goal of bringing returns to investors and achieving social development to attract more funds. Due to increased funding in the form of debt or equity microfinance institutions could expand and improve their services. We will analyze the behavior of historical returns of microfinance investment funds specified in subsequent sections with respect to the movement of returns obtained from traditional investment strategies such as equity investment and investment in fixed income instruments. First, we will ask to what extent microfinance investment funds that are subject to this study are dependent on developed global markets as well as emerging markets.

We define out first hypothesis as:

- **H1:** Returns on investment in microfinance investment funds are not positively correlated (in terms of portfolio beta) with returns on a market portfolio.

In the case the first hypothesis is confirmed, we may argue that an addition of microfinance assets to a wider portfolio of assets (that is already well-diversified against a specific risk) could represent an attractive opportunity for an investor seeking portfolio diversification by decreasing the systematic risk of the overall portfolio.

Since the risk management is only one part of investor's field of interest, we will direct the second hypothesis at microfinance funds' performance compared to market alternatives. Therefore, we will examine whether funds in question were over the study period able to generate average returns that would surpass or reach at least the same levels as returns on investment in market portfolio. We define our second hypothesis as:

- **H2:** Returns on investment in microfinance investment funds exceed the expected returns on a market portfolio predicted by the capital asset pricing model.

To assess the prospects of investment in microfinance investment funds (both in terms of their risk profile and returns it generates) we will proxy the market portfolio by both developed and emerging markets indices in order to be able to capture the effect of different regional attributes. We will use fixed income indices in order to mimic the nature of investment of microfinance funds using primarily the money funds for acquisition of debt related instruments. We will refer attributes of MIVs to the global and emerging markets stock indices as part of funds' capital could be invested in equity stakes of microfinance institutions too.

We will base our analyses on historical returns and the predictive power of whatever conclusion we will reach is going to be limited by the assumption that only historical returns may explain market trends. However an important feature of our historical returns is that the period over which the study is conducted covers both *bull and bear markets* including rather disturbing times after the financial crisis.

In the case both hypotheses are confirmed we may see the microfinance sector as a class of assets that is able to compete for the attention of both socially responsible investors but

also commercially oriented institutional asset managers. In consequence, this move could reduce possible investing stigma associated with microfinance investing (McCluskey and Rausser, 2003) and bring more funding to the sector (and deeper down the sector towards the most impoverished microentrepreneurs), which would surely be a positive sign for developing countries. (Svárovská, 2009).

While the microfinance is a subject of a number of research papers, for a representative selection of different perspectives see Armendáriz de Aghion and Morduch (2005), Cassar and Wydick, B. (2010), Cull et al. (2009), Giné et al. (2010), Giné and Karlan (2009), and Ledgerwood and White (2006), an investigation of investment performance and portfolio inclusion benefits of microfinance institutions is a very recent research direction. Therefore it is limited so far only to a few academic papers (Gonzales, 2007; Koivulehto, 2007; Krauss and Walter, 2009; Janda and Svárovská, 2010; Ahlin et al., 2011; Galema et al., 2011). Out of these papers only Janda and Svárovská (2010) are concerned with microfinance investment funds. All the other papers investigate direct investment into microfinance institutions which is a related, but different research question.

Our approach based on investing into microfinance investment funds instead of directly funding particular microfinance institutions (MFI), as considered by the rest of literature, seems much better suited for a wide spectrum of investors who are not familiar with microfinance sector and who are likely to be concerned with financial performance of their investment. In our paper we focus on market returns that are the actual investor's returns which we consider more relevant for actual decisions of potential investors as compared to the use of annual book values of MFIs' assets and other performance ratios based on MFIs' annual financial reports as was done by other authors. An additional technical advantage of considering microfinance funds instead of microfinance institutions is also an availability of higher frequency (monthly) data.

This paper constitutes an extension of our previous paper, Janda and Svárovská (2010), where we investigated a monthly performance of five commercial microfinance investment funds (MIVs) and their currency sub-funds (USD, EUR and CHF) from January 31, 2006 until March 31, 2009. The examined funds have recorded lower total risk than global stocks and bonds (measured by four benchmark indices) with moderate but stable returns. The analysis revealed that investment in microfinance investment funds represents an attractive opportunity for the portfolio diversification as this asset class does not show any positive correlation with global or emerging capital markets. At the same time, it provides adequate risk-adjusted returns and may therefore be attractive not only for investors with a particular

interest in the socially responsible aspect of investment into microfinance. (Janda and Svárovská, 2010).

While in the previous study we did not include all existing funds due to the short length of series, this present study aims to encompass as many commercial microfinance investment funds as possible no matter the length of the time series to provide more tangible financial implications of the investment in commercially-oriented MIVs. We overcome the difficulty of short data by unbalanced panel data analysis. In addition, we examine Euro and U.S. dollar denominated funds separately and adjust their returns by risk-free rates in respective currencies to avoid possible bias caused by volatility of EUR/USD exchange rate. Longer data series used (from January 2006 until September 2010) cover an interesting period with respect to recent financial crisis as well as economic recession that followed and will allow us to evaluate the risk and return qualities of microfinance funds with regard to this aspect. Inclusion of more investment funds, longer time series, comparison of EUR and USD denominated funds, and the use of cross-sectional regression approach instead of carrying out separate time series analyses as in our previous paper Janda and Svárovská (2010) leads to more robust and generally valid results and provides an important original research contribution. In addition to the CAPM-beta and Jensen`s alpha approach used already by Janda and Svárovská (2010) we use also mean- variance spanning test to investigate the risk-return trade-off of investments in MIVs and their diversification potential.

2 Estimation Methodology

In order to examine whether microfinance investment funds have (or have not) a portfolio diversification value for an investor, we need to assess their risk within a broader portfolio and analyze fund's correlation to chosen benchmarks. For this aim, we will first assess the portfolio beta in the tradition of the Sharpe (1964) and Lintner (1965) capital asset pricing model (CAPM) as specified in equation 1 by regressing the risk-free rate adjusted returns of studied microfinance investment funds (hereinafter also “adjusted returns”) against four selected market portfolios (world indices).

$$r_{it} - r_{ft} = \alpha_i^J + \beta_i\left(r_{Mt} - r_{ft}\right) + \varepsilon_t \qquad (1)$$

where r_{it} and r_{Mt} are returns of a microfinance fund i and of a market portfolio M respectively, r_{ft} is yield on a risk-free asset in time t and ε_t is the error term for time t.

We will draw our conclusions with respect to studied funds' risk and return features upon estimated values of regression coefficients α^J (Jensen's alpha), β, and the value of model's R-squared.

We will estimate equation 1 with a cross-sectional regression of adjusted returns of individual funds on adjusted market returns taking advantage of unbalanced panel methods due to different times of fund's introduction on the market as well as disappearance of several funds up to this day. As pointed out by Brown et al. (1992) leaving out dead funds leads to an upward bias of relative performance measures as poor performers are liquidated or merged into other funds. Ferson and Schadt (1996) suggest that the presence of survivorship bias shifts the distribution of Jensen's alphas to the right leading to on average higher systematic risk-adjusted performance results. The inclusion of dead funds enables us to avoid such survivorship bias. In addition, the panel structure of our study allows tracking the development of individual MFIs' adjusted returns over time and helps to prevent flaws caused by period-specific exceptional events for individual funds.

In order to assess the diversification benefits of microfinance investment funds we will in addition to the analysis based on the assessment of portfolio beta and Jensen's alpha conduct, similarly to Galema et al. (2011), a mean-variance spanning test. As described by Huberman and Kandel (1987), the mean-variance spanning test determines whether the minimum-variance frontier of *K*+*N* assets is spanned by the minimum-variance frontier of a subset of assets *K*, or in other words, whether an investor, conditional on having a portfolio of *K* assets, can benefit by investing in a new set of *N* assets. The most recent overview of tests of mean-variance spanning is provided by Kan and Zhou (2012).

In our case, we test whether the minimum-variance frontier of a given benchmark market index (i.e. *K*) spans the minimum-variance frontier formed with the benchmark index and microfinance investment fund (i.e. *K*+*N*). Following DeRoon and Nijman (2001), to perform spanning tests we will run pooled panel regression specified in equation 2. Then we will test the null hypothesis of spanning test as expressed in equation 3.

$$r_{it} = \alpha_i + \beta_i r_{Mt} + \varepsilon_t \quad (2)$$

$$H_0: \alpha_i = 0 \text{ and } \beta_i = 1 \quad (3)$$

where r_{it} and r_{Mt} are returns on a microfinance fund i and on a market portfolio M respectively and ε_t is the error term for time t.

In cases we reject spanning, we show that the inclusion of microfinance funds shifts the minimum-variance frontier formed by selected benchmark index and consequently the risk-return characteristics of such enlarged portfolio improve.

The use of CAPM alpha and beta and the mean-variance spanning test are obviously not the only possible ways how to evaluate the investment portfolio. For example Rutkauskas and Stasytyte (2011) consider optimal portfolio building techniques based on the effectiveness, riskiness and reliability based approach to utility maximization. Another alternative possibility is to consider instead of simple one-factor CAPM model some multifactor model belonging to the class of Arbitrage Pricing Theory (APT) models. According to APT security returns are described by a factor model, there are sufficient securities to diversify away idiosyncratic risk and well-functioning security markets do not allow for the persistence of arbitrage opportunities. An advantage of APT as compared to CAPM is that APT is more general in that it captures an expected return and beta relationship without the assumption of the market portfolio.

Among the multi-factor APT models suitable for our analysis of MIV we may consider three possible approaches: macroeconomic, fundamental and statistical models. Macroeconomic models compare a security's return to such factors as employment, inflation and interest. Fundamental models analyze the relationship between a security's return and its underlying financials, such as earnings. Statistical models are suitable for comparing the returns of different securities based on the statistical performance of each security. Consideration of financial risk and return dimensions of investment problem jointly with the goal of social responsible investment places our performance measurement problem in a wider class of multiple criteria decision making problems (Zavadskas and Turskis, 2011; Brauers and Zavadskas, 2011). The difficulty of evaluating the performance of microfinance related activities is also increased by an important inclusion of social and cultural motivations and incentives (Alas et al., 2011).

Further investigation of the desirability of microfinance investment as compared to other socially responsible investments may be an obvious extension of the methodology presented in this paper. Another related research question for further research is the fundamental investigation of social desirability/undesirability of particular investment and other economic decisions. This question of social desirability is presented for example by Janda and Mikolasek (2011).

3 Data

3.1 *Microfinance Funds' Data*

For our empirical analysis we consider 21 selected open-end microfinance investment funds from January 2006 to September 2010. Our sample of funds is selected out of the list of microfinance investment funds pre-screened by Association of the Luxembourg Fund Industry (2010). Fifteen funds are denoted in Euro, the remaining 6 are USD denominated funds. Fund's performance data (in terms of historical net asset values per share – hereinafter "NAV") were acquired using Bloomberg. Additional data on microfinance investment funds were collected by hand using funds' prospectuses, monthly and annual reports and websites.

The microfinance investment vehicles universe comprehends according to a survey carried out by MicroRate 88 MIVs of different investment structures worldwide (as of December 31, 2009).[1] Therefore, we cannot claim the chosen sample of funds is a representative of the entire universe of investment vehicles in microfinance, nor of all MIVs of the same investment structure. Rather, funds included in this study were selected based on availability and quality of data, their commercial orientation and their structure (open-end mutual funds). More details about the structure of possible microfinance investments are provided by Christen, and Drake (2002), Goodman (2007), and Kneiding et al. (2010).

From the pool of existing MIVs it appears that our sample includes the most developed funds with transparent portfolio structure inherent to developed financial markets and clearly defined financial and social objectives. Those are, in our opinion, funds that commercially oriented investors not familiar with the microfinance sector may consider. Such investors may come not only from developed countries but also from emerging markets like former centrally planned European countries (Debski and Swiderski, 2011).

In calculation of monthly returns net asset values of funds per share were used. The use of monthly data is justified by the fact that for most of the funds the net asset values are calculated on a fixed valuation day once or twice a month. We focus on market returns (in terms of change in NAV per share, which is the price investors pay for a share and are paid when redeeming fund's shares) that are the actual investor's returns compared to previous papers on investment in microfinance looking at annual book values of MFI's assets and other performance ratios based on MFIs' annual financial reports. For discussion of measurement and investment significance of market returns see Lee et al. (2011). Another advantage of

[1] MicroRate (2010)

evaluating directly microfinance investment funds is the use of monthly net asset values, which allows us to examine the impacts of the global economic recession triggered by the financial crisis after the fall of *Lehman Brothers* in September 2008.

All funds' returns are reinvested (MIVs' return did not have to be in any way adjusted). All returns are net of management expenses and administrative fees but disregard subscription and exit fees and are before taxes. We use in our analysis natural log return formula (equation 4) to minimize the effect of possible outlier observations on returns.[2]

$$r_t = \ln(X_t/X_{t-1}) \tag{4}$$

Where X_t refers either to the net asset value of a microfinance fund in time *t* or to the index level of a given market benchmark in time *t*.

3.2 *Performance Benchmarks and the Risk-free Rate*

In the performance evaluation, our aim is to compare the adjusted returns on microfinance investment funds with the adjusted returns on certain benchmarks that might be investors' main alternative to microfinance engagement. We will use multiple indices as proxies for the market risk in order to account for multiple investment alternatives of potential investors and to augment the robustness of our results. We chose to include both stock indices as well as fixed income benchmarks as the majority of funds in the studied portfolio may provide loans and invest in debt instruments as well as may acquire equity stakes in MFIs. The use of equity indices is specifically justified by the fact that both stocks and microfinance assets may address the same type of investors who are not necessarily risk-averse.

Global bond markets are proxied by Markit iBoxx EUR Liquid Corporates Index reflecting yields on Euro denominated highly liquid corporate bonds. In order to examine microfinance funds' performance relative to the emerging fixed income markets we will work with the J.P. Morgan Emerging Market Bond Index Plus intended to replicate the total returns of traded external debt instruments in the emerging markets. To describe the stock market we consider the Morgan Stanley Capital International World Index (hereinafter also "MSCI World") that is designed to measure equity market performance of developed markets (Index

[2] A graphical analysis has not shown a presence of outliers in case of returns of microfinance investment funds. Nevertheless the use of natural log return formula is justified especially for the benchmark indices' returns that could be prone to outliers.

definitions: http://www.mscibarra.com). In addition to looking at the risk and return characteristics of MIVs in the light of global stock markets, we also compare them to emerging markets securities by regressing fund's adjusted returns against MSCI Emerging Markets Index (hereinafter also "MSCI EM"). The MSCI EM Index covers regions that are often represented in portfolios of studied microfinance funds (the index includes countries such as India and countries of Southeast Asia, followed by Mexico and South American countries as Brazil, Chile, Colombia or Peru) (Index definitions: http://www.mscibarra.com). Returns on benchmark indices are calculated according to the previously mentioned return formula (equation**Error! Reference source not found.** 4) and Bloomberg and Markit were the source for all indices' data.

As mentioned previously, microfinance investment funds in the studied sample are denoted in two different currencies, Euro and the U.S. dollar. We therefore distinguish two microfinance portfolios for which we will carry out the analysis separately. In order to reach consistent results with respect to risk-free rate adjusted monthly returns of given investment options we use two different risk-free rates – one denominated in EUR and second in USD. We define the risk-free interest rate as a rate of return on an asset with zero default risk and low liquidity risk. Therefore, risk-free returns are most commonly proxied by yields on government securities of the currency in question. We use yields on 10Y German government bonds and 10Y U.S. government bonds for the EUR and the USD microfinance funds' portfolios respectively. Data for risk-free rates were obtained from Bloomberg.

In Table 1 and Table 2 we provide key performance statistics of selected microfinance funds and benchmark indices, namely volatility (standard deviation) of monthly returns, minimum and maximum month-on-month returns, the percentage of months with negative returns and total per annum returns.

- insert Table 1 and Table 2 here -

4 Regression Results Based on CAPM

In order to assess microfinance funds' performance and their market correlation, we first estimate a CAPM-like model (equation 1) using risk-free rate adjusted monthly return data (natural log returns as specified in equation 4) of microfinance funds and market benchmarks. In order to estimate equation 1 we run a cross-sectional regression of adjusted MIVs' returns

against adjusted returns of particular market proxies using Stata.[3] Table 3 displays p-values of the Breusch and Pagan Lagrange multiplier (LM) test for random effects and of the F-test for testing fixed group effects used to identify the best estimation method.[4] Resulting p-values are for both Euro and U.S. dollar microfinance funds and with respect to all given indices very high. We may therefore accept the null hypotheses that the pooled regression model is the adequate one (against the fixed and random effects models).

- insert Table 3 here -

Based on the testing results reported in the previous paragraph we run pooled OLS regression and perform tests for heteroskedasticity and autocorrelation (Table 4). Both the Breusch-Pagan/Cook-Weisberg test and the White's test suggest homoskedastic errors for all regression models of Euro denominated MIVs and the case when U.S. dollar MIVs are regressed against J.P. Morgan Emerging Bond Index. The most likely deviation from homoskedastic errors in the context of panel data is likely to be error variances specific to the cross-sectional unit (Stata Resources and Support: http://www.stata.com). The Modified Wald Test for groupwise heteroskedasticity confirms this suggestion in our case. The Wooldridge test for first-order autocorrelation of residuals in Panel D in Table 4 suggests autocorrelation for regressions of MIVs in U.S. dollar.[5] Due to given results, we estimate the pooled model using "panel-corrected standard errors" (PCSEs) estimates for linear cross-sectional time-series models where the parameters are estimated by Prais-Winsten regression.[6] Beck and Katz (1995) showed that the "feasible generalized least squares" (FGLS) procedure, which is also commonly used in such cases, "has extremely poor statistical properties unless the length of series is significantly higher than the number of cross-sections, which is rare, and the method is seldom used any more." Beck (2008) supports the choice of PCSEs in place of the OLS standard errors when correction of standard errors is necessary due to

[3] Stata estimation algorithms take care of the unbalanced nature of the dataset.
[4] To test whether fixed effects model, random effects model or pooled model are adequate we interpret F-test statistic after Stata command "xtreg dependent_variable independent_variables, fe" and the Breusch and Pagan LM test using Stata command "xttest0" after "xtreg dependent_variable independent_variables, re."
[5] We use Stata commands "hettest, fstat" and "whitetst" after "regress dependent_variable independent_variables" for the Breusch-Pagan/Cook-Weisberg test and the White's test respectively. For the modified Wald Test for groupwise heteroskedasticity we use "xttest3" after "xtgls dependent_variable independent_variables." Wooldridge test for first-order autocorrelation of residuals is carried out using "xtserial dependent_variable independent_variables" command.
[6] OLS regression might lead to statistically inefficient results as well as to wrong standard errors. When computing the standard errors and the variance-covariance estimates, PCSE in Stata assumes that the disturbances are heteroskedastic and contemporaneously correlated across panels. We assume first-order autocorrelation within panels and that the coefficient of the AR (1) process is specific to each panel. Chosen "pairwise" option specifies how missing observations in unbalanced panels should be treated when estimating the interpanel covariance matrix of the disturbances, i.e. "pairwise" specifies that for each element in the covariance matrix, all available observations (periods) that are common to the two panels contributing to the covariance are used to compute the covariance. (Stata Resources and Support: http://www.stata.com). We use a Stata command: "xtpcse dependent_variable independent_variables, correlation (psar1) pairwise."

contemporaneously correlated and panel heteroskedastic errors.

- insert Table 4 here -

4.1 *Systematic Risk Measured by Beta*

Regression estimates of beta and related R-squared measures are presented in Table 5. Beta estimates are for all regressions negative, ranging from -0.07 to figures close to zero. All results except for the relationship between USD denominated funds and world's markets stocks (MSCI World) are statistically significant (on at least 10% significance level).[7] Beta measures the sensitivity of asset's adjusted return to moves in adjusted returns of benchmark indices. Close-to-zero estimates of beta suggest that adjusted returns of microfinance funds in the sample do not move in the same direction as adjusted returns on investment in both world and emerging markets' stocks and fixed income instruments.

While the beta estimates measure the direction of correlation (which is slightly negative in our case) the model's R-squared measures the tightness of the correlation in the sense of how much of MIV's moves in adjusted returns could be explained by moves in adjusted returns of benchmark indices. The explanatory power of the panel data models (measured by R-squared) is low, reaching less than 5%. The remaining share of variance in funds' adjusted returns is due to other aspects than is the trading sentiment on stock or bond markets. Higher R-squared for models of Euro denominated funds using the weighted portfolio approach reaching up to 26% might be due to differences in two chosen calculation approaches. This, however, does not matter for drawn conclusion based significantly on the zero returns' sensitivity to benchmarks shown by beta. This translates in zero systematic (non-diversifiable) risk of microfinance funds. Therefore an addition of microfinance assets to already well-diversified portfolio (against the unsystematic risk) could reduce the systematic risk of the whole portfolio. The specific risk is perceived to be high as microfinance is not yet defined as a specific asset class. That's why there is a need for a portfolio that is already well diversified against the specific risk, to which we would add microfinance assets to lower the market exposure of the overall portfolio.

- insert Table 5 here -

[7] Hereinafter and if not specified otherwise, the term “statistically significant” refers to significant on at least 10% significance level.

4.2 *Performance Measured by Alpha*

The regression estimates for the Jensen's alpha measure are shown in Table 6. Significant estimates reveal that over the given time span microfinance funds outperformed benchmark indices by between 22 to 31 basis points (in terms of monthly returns). There is virtually no difference across models taking into account different benchmarks. On the other hand, U.S. dollar MIVs seems to be more efficient in terms of alpha, i.e. added return over the theoretical expected return compensating an investor for the systematic risk. Hereinafter and if not specified otherwise, the term "added return" (measured by the Jensen's alpha) refers to added return over the theoretical expected return implied by the CAPM that compensate an investor for the systematic risk measured by beta. The economic meaning of this term is different from above defined "adjusted returns", which relate to monthly returns of microfinance investment funds or benchmark indices adjusted for the respective risk-free rate.

- insert Table 6 here -

5 Mean-variance spanning test

As a final step of our analysis we performed a mean-variance spanning test in order to assess whether adding microfinance to a benchmark portfolio allows investors to reach a mean-variance efficient portfolio with a higher mean and a lower variance (Galema et al., 2011). We run pooled panel regression specified in equation 2. Associated p-values to the test statistics under the joint restriction that $\alpha_i = 0$ and $\beta_i = 1$ corresponding to the null hypothesis of the spanning test (as expressed in equation 3)[8] that the minimum-variance frontier formed by a larger subset of assets including a microfinance fund is spanned by the benchmark index are presented in Table 7. We reject the null hypothesis suggesting that additional diversification of a market portfolio as proxied by four global and emerging market indices by microfinance investment funds may improve the risk-return characteristics of the portfolio.

- insert Table 7 here -

[8] The null hypothesis of the spanning test was tested using the "test (_cons=0) (independent_variable=1)" Stata command after having estimated the equation 2 using the "xtpcse dependent_variable independent_variables, correlation (psar1) pairwise" command.

6 Conclusions

The aim of this study was to confirm or reject two hypotheses related to the risk profile and return qualities of specialized investment funds that invest in debt instruments and equity of microfinance institutions.

With regard to the dependence of microfinance funds' returns on the performance of stock and fixed income markets in developed and emerging economies we found slightly negative correlation when measured by the portfolio beta measure. Significant beta estimates are for regressions against all indices slightly negative but close to zero. We may therefore accept our first hypothesis that “returns on investment in microfinance investment funds are not positively correlated with returns on the market portfolio” (proxied by four chosen indices). However, the analysis of microfinance funds denominated in the U.S. dollar did not yield so statistically significant beta estimates. Therefore, drawn conclusions from the analysis of systematic risk are specific primarily to Euro denominated funds. Our results suggest an independence (or slightly negative dependence) of microfinance funds' returns on the performance of global and emerging stock and bond markets. Zero systematic risk of microfinance assets could therefore positively contribute to a better diversification of broader portfolios against the impact of the investment sentiment on global markets.

Although an indirect investment in microfinance through structured investment vehicles is surely less risky than exposure to one or few MFIs (due to diversification of funds' manager, indirect exposure to foreign exchange rate risk as well as higher liquidity of investment assured by redemption rights), such investment still brings along specific risk connected to funds' underlying assets, which may imperil MFIs' ability to generate profit or to respond to their obligations on loans repayment. The liquidity issue remains to be important because of a given time notice that needs to be respected when redemption rights are exercised. Some funds, therefore, suggest that the investment in funds' shares should be viewed as a medium to long-term investment. Bearing in mind the still rather high specific risk of microfinance investment, an inclusion of microfinance assets intended to lower portfolio's overall market exposure is desirable when the current portfolio is already well diversified against the unsystematic risk.

Return qualities of microfinance funds were in this paper proxied by the Jensen's alpha measuring the added returns on an asset over returns that an investor would deserve to compensate him for the systematic risk of holding such asset measured by beta. Estimates were in average significant for both Euro and the U.S. dollar denominated funds, with USD

funds that reached on average higher added returns in terms of Jensen's alpha compared to their currency concurrent. This suggests that an investor that includes shares of microfinance investment funds in his portfolio does not pay (in terms of opportunity costs) for his decision to invest in socially responsible assets. As a consequence, we may confirm our second hypothesis that "returns on investment in microfinance investment funds exceed the returns on the market portfolio." The latter together with reported near-to-zero beta estimates as a proxy for the systematic risk are perceived to be the main advantages of an inclusion of microfinance assets in a portfolio compared to pure stock or bond portfolios. The robustness of these results is confirmed by mean-variance spanning test of diversification potential of investments in MIVs which show that inclusion of MIVs indeed improves the risk-return characteristics of the portfolio.

Previous research on the performance of microfinance has examined the profitability of microfinance institutions and its dependence on the performance of global financial markets or national economies. All previous studies treated directly the microfinance institutions and revealed that in average the profitability of MFIs is not correlated with the performance of global financial markets, but may be susceptible to the growth of domestic economies. The objective of our study was to examine the risk-return profile of specialized microfinance investment funds investing in debt or equity of microfinance institutions and acting as financial intermediaries between the final investor and MFIs. There are two important advantages connected to the approach of evaluation of investment funds rather than MFIs. First is the availability of monthly data and the second is the focus on the actual investors' returns (in terms of the change in net asset values per share). On the other hand, we identify several limitations of our results. Microfinance funds are rather a recent phenomenon and before 2006 (i.e. the start of our examination period) there were only a few active commercial funds. For this reason we may not examine longer time series to be able to capture the effect of the business cycle development.

Likewise, the chosen approach focuses on quite a different group of MFIs. While previous studies took into account financial indicators available for as much MFIs as possible from all over the world (MFIs reporting to MIX Market database), our analysis may have targeted at the end only the most successful and commercially viable MFIs. The reason behind is the selection process of funds' asset managers who seek to invest in suitable (i.e. successful and sustainable) MFIs, which might be concentrated only in certain world regions.

We may conclude that given the supply-demand gap in the sector of small business

loans in developing and transition economies, the prospective of future growth in the sector is realistic if necessary funding is available for expanding microfinance institutions. Our study based both on CAPM beta, Jensen`s alpha and mean-variance spanning tests showed that microfinance assets may be perceived as a good systematic risk diversification tool, which generates adequate risk-adjusted returns and may therefore be attractive to investors from developed markets. Furthermore, a global trend goes towards a greater emphasis of socially responsible investment and microfinance as part of it may be able to profit from this growing tendency. As a consequence, we may hope for further expansion of MFIs' activities and better development of regions where they act.

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Tables

Table 1 – Monthly Returns Analysis

MIV	Currency / Class	Mean (Median) Monthly Return		Standard Deviation in Monthly Returns	Min Monthly Return	Max Monthly Return	Percentage of Months with Negative Returns
Panel A: EUR denominated MIVs							
responsAbility Global Microfinance Fund	EUR	0.31%	[0.27%]	0.38%	-0.36%	2.38%	10.53%
responsAbility Mikrofinanz Fund	EUR	0.07%	[0.28%]	0.87%	-4.10%	0.61%	10.00%
Dual Return - Vision Microfinance Fund	EUR / Class P	0.27%	[0.28%]	0.17%	-0.19%	0.66%	5.66%
Dual Return - Vision Microfinance Fund	EUR / Class I	0.37%	[0.39%]	0.17%	-0.14%	0.72%	5.56%
Dexia Micro-Credit Fund - BlueOrchard Debt Sub-Fund	EUR	0.31%	[0.34%]	0.21%	-0.29%	0.90%	7.02%
Edmond de Rothschild – Saint-Honore Microfinance	EUR	0.20%	[0.16%]	0.22%	-0.12%	0.80%	17.54%
BBVA Codespa Microfinanzas	EUR	0.20%	[0.15%]	0.91%	-2.29%	2.69%	37.78%
Wallberg Global Microfinance Fund	EUR / Class I	0.24%	[0.22%]	0.21%	-0.13%	0.65%	8.70%
Wallberg Global Microfinance Fund	EUR / Class P	0.08%	[0.28%]	1.02%	-4.49%	0.68%	17.39%
Dutch Microfund	EUR	0.40%	[0.17%]	1.55%	-1.99%	4.99%	45.83%
Erste-Sparinvest Espa Vinis Microfinance	EUR	0.09%	[0.08%]	0.44%	-0.64%	0.90%	37.50%
Triodos Microfinance Fund	EUR / Class I-cap	0.29%	[0.18%]	0.48%	-0.54%	1.31%	23.53%
Triodos Microfinance Fund	EUR / Class B-cap	0.25%	[0.18%]	0.51%	-0.62%	1.25%	40.00%
Triodos Microfinance Fund	EUR / Class B-dis	0.16%	[0.06%]	0.43%	-0.59%	1.26%	40.00%
Triodos Microfinance Fund	EUR / Class I-dis	0.15%	[0.12%]	0.46%	-0.82%	1.30%	27.78%
Triodos Microfinance Fund	EUR / Class R-cap	0.27%	[0.20%]	0.52%	-0.59%	1.25%	35.71%
Median for EUR MIVs		**0.24%**	**[0.19%]**	**0.45%**	**-0.59%**	**1.08%**	**20.54%**
Mean for EUR MIVs		**0.23%**	**[0.21%]**	**0.54%**	**-1.12%**	**1.40%**	**23.16%**
Panel B: USD denominated MIVs							
responsAbility Global Microfinance Fund	USD	0.38%	[0.38%]	0.40%	-0.33%	2.57%	10.53%
responsAbility Microfinance Leaders Fund	USD	0.38%	[0.39%]	0.44%	-0.51%	2.14%	13.04%
Dual Return - Vision Microfinance Fund	USD / Class P	0.23%	[0.34%]	1.64%	-8.26%	5.26%	7.89%
Dexia Micro-Credit Fund - BlueOrchard Debt Sub-Fund	USD	0.37%	[0.40%]	0.26%	-0.19%	1.11%	7.02%
EMF Microfinance Fund AGmvK	USD / Class A	0.11%	[0.33%]	0.89%	-3.94%	0.44%	8.70%
EMF Microfinance Fund AGmvK	USD / Class T	0.30%	[0.33%]	0.12%	-0.11%	0.44%	4.35%
Median for USD MIVs		**0.34%**	**[0.36%]**	**0.42%**	**-0.42%**	**1.63%**	**8.30%**
Mean for USD MIVs		**0.30%**	**[0.36%]**	**0.62%**	**-2.22%**	**1.99%**	**8.59%**
Panel C: Benchmark indices (incl. risk-free rate)							
MSCI World Index		0.05%	[1.07%]	5.62%	-19.04%	10.90%	47.37%
MSCI Emerging Markets Index		1.09%	[0.96%]	8.25%	-27.50%	16.66%	40.35%
Markit iBoxx EUR Liquid Corporates Bond Index		0.31%	[0.30%]	1.32%	-4.78%	3.66%	38.60%
J.P. Morgan Emerging Bond Index		0.79%	[1.07%]	2.97%	-13.79%	8.52%	26.32%
10Y German Government Bonds		0.30%	[0.31%]	0.05%	0.18%	0.38%	not applicable
10Y U.S. Government Bonds		0.33%	[0.32%]	0.06%	0.18%	0.43%	

Notes: All returns calculations of monthly returns are based on simple return formula, i.e. $(return_t - return_{t-1}) / return_{t-1}$.

Source: own calculations based on data from Bloomberg and Markit

Table 2 – Total p.a. Returns of Microfinance Investment Funds and Benchmark Indices

MIV	Currency / Class	Total return p.a.					Total return from 2006 (or inception)
		2006	2007	2008	2009	2010*	
Panel A: EUR denominated MIVs							
responsAbility Global Microfinance Fund	EUR	2.70%	6.31%	6.88%	1.09%	1.29%	19.48%
responsAbility Mikrofinanz Fund	EUR	n.a.	2.15%	3.64%	-2.01%	-1.20%	2.50%
Dual Return - Vision Microfinance Fund	EUR / Class P	0.45%	3.11%	5.60%	3.27%	1.87%	15.07%
Dual Return - Vision Microfinance Fund	EUR / Class I	n.a.	1.17%	6.30%	3.94%	2.34%	14.39%
Dexia Micro-Credit Fund - BlueOrchard Debt Sub-Fund	EUR	4.21%	4.83%	5.90%	2.42%	0.70%	19.32%
Edmond de Rothschild – Saint-Honore Microfinance	EUR	2.04%	2.27%	3.93%	2.79%	0.47%	12.00%
BBVA Codespa Microfinanzas	EUR	n.a.	2.24%	6.65%	-0.69%	0.73%	9.08%
Wallberg Global Microfinance Fund	EUR / Class I	n.a.	n.a.	-0.12%	3.95%	1.83%	5.73%
Wallberg Global Microfinance Fund	EUR / Class P	n.a.	n.a.	-0.17%	4.60%	-2.66%	1.64%
Dutch Microfund	EUR	n.a.	n.a.	2.64%	2.98%	3.78%	9.70%
Erste-Sparinvest Espa Vinis Microfinance	EUR	n.a.	n.a.	n.a.	n.a.	0.75%	0.75%
Triodos Microfinance Fund	EUR / Class I-cap	n.a.	n.a.	n.a.	1.08%	3.60%	4.72%
Triodos Microfinance Fund	EUR / Class B-cap	n.a.	n.a.	n.a.	0.32%	3.14%	3.47%
Triodos Microfinance Fund	EUR / Class B-dis	n.a.	n.a.	n.a.	0.32%	1.91%	2.23%
Triodos Microfinance Fund	EUR / Class I-dis	n.a.	n.a.	n.a.	1.20%	1.42%	2.64%
Triodos Microfinance Fund	EUR / Class R-cap	n.a.	n.a.	n.a.	0.44%	3.11%	3.56%
Median for EUR MIVs		**2.37%**	**2.27%**	**4.77%**	**1.20%**	**1.63%**	**5.22%**
Mean for EUR MIVs		**2.35%**	**3.15%**	**4.13%**	**1.71%**	**1.44%**	**7.89%**
Panel B: USD denominated MIVs							
responsAbility Global Microfinance Fund	USD	5.07%	7.70%	6.44%	1.16%	1.60%	23.79%
responsAbility Microfinance Leaders Fund	USD	0.34%	6.03%	7.51%	1.74%	2.46%	19.23%
Dual Return - Vision Microfinance Fund	USD / Class P	1.70%	5.51%	4.31%	-2.94%	n.a	8.63%
Dexia Micro-Credit Fund - BlueOrchard Debt Sub-Fund	USD	6.90%	5.89%	5.64%	2.25%	0.81%	23.27%
EMF Microfinance Fund AGmvK	USD / Class A	n.a.	n.a.	0.03%	4.37%	-1.74%	2.58%
EMF Microfinance Fund AGmvK	USD / Class T	n.a.	n.a.	0.03%	4.37%	2.73%	7.25%
Median for USD MIVs		**3.38%**	**5.96%**	**4.98%**	**2.00%**	**1.60%**	**13.93%**
Mean for USD MIVs		**3.50%**	**6.28%**	**3.99%**	**1.82%**	**1.17%**	**14.13%**
Panel C: Benchmark indices							
MSCI World Index		17.95%	7.09%	-42.08%	26.98%	0.92%	-6.25%
MSCI Emerging Markets Index		29.18%	36.48%	-54.48%	74.50%	8.70%	52.24%
Markit iBoxx EUR Liquid Corporates Bond Index		0.40%	-0.24%	-3.99%	16.02%	6.55%	18.88%
J.P. Morgan Emerging Bond Index		10.48%	6.45%	-9.70%	25.95%	14.46%	53.10%

Notes: *returns for 2010 are calculated for the time span from January 1, 2010 until September 30, 2010. All returns calculations of monthly and per annum returns are based on simple return formula, i.e. $(return_t - return_{t-1}) / return_{t-1}$.

Source: own calculations based on data from Bloomberg and Markit

Table 3 – Cross-sectional Regression Tests

	MSCI World Index	MSCI Emerging Markets Index	Markit iBoxx EUR Liquid Corporates Bond Index	J.P. Morgan Emerging Bond Index
Panel A: F-test for fixed group effects				
	p-value	p-value	p-value	p-value
EUR denominated MIVs	0.7859	0.7995	0.7666	0.7954
USD denominated MIVs	0.6990	0.7138	0.7887	0.7520
Panel B: Breusch and Pagan Lagrangian multiplier (LM) test for random effects				
	p-value	p-value	p-value	p-value
EUR denominated MIVs	0.5793	0.5487	0.5720	0.5527
USD denominated MIVs	0.3459	0.3348	0.2869	0.3095

Notes: The null hypothesis of the F-test of joint significance of differing group intercepts is that the cross-sectional units all have a common intercept (in which case the pooled regression model is appropriate) against the alternative favoring the use of fixed effects model.

The null hypothesis of the Breusch and Pagan LM test for one-way random group effects is that cross-sectional variance components are zero. If the null hypothesis is not rejected, the pooled regression model is appropriate (otherwise the random effects model is preferred).

Source: own calculations based on data from Bloomberg and Markit

Table 4 – Tests for Heteroskedasticity and Autocorrelation

	MSCI World Index	MSCI Emerging Markets Index	Markit iBoxx EUR Liquid Corporates Bond Index	J.P. Morgan Emerging Bond Index
Panel A: Breusch-Pagan/Cook-Weisberg test for heteroskedasticity				
	p-value	p-value	p-value	p-value
EUR denominated MIVs	0.5380	0.8756	0.3174	0.4804
USD denominated MIVs	0.1505	0.1167	0.1064	0.1955
Panel B: White's test for heteroskedasticity				
	p-value	p-value	p-value	p-value
EUR denominated MIVs	0.7924	0.9644	0.6022	0.7743
USD denominated MIVs	**0.0193**	**0.0388**	**0.0478**	0.2188
Panel C: Modified Wald Test for groupwise heteroskedasticity				
	p-value	p-value	p-value	p-value
EUR denominated MIVs	**0.0000**	**0.0000**	**0.0000**	**0.0000**
USD denominated MIVs	**0.0000**	**0.0000**	**0.0000**	**0.0000**
Panel D: Wooldridge test for autocorrelation in panel data				
	p-value	p-value	p-value	p-value
EUR denominated MIVs	0.3316	0.3047	0.3634	0.312
USD denominated MIVs	**0.0085**	**0.0093**	**0.0278**	**0.0110**

Notes: The null hypothesis of the Breusch-Pagan/Cook-Weisberg test is that the error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more variables. Panel A shows p-values for modified Breusch-Pagan/Cook-Weisberg test, which drops the assumption of normal distribution of the regression disturbances.

The Breusch-Pagan/Cook-Weisberg test does not work well for non-linear forms of heteroskedasticity. For that reason we use the White's general test for heteroskedasticity in Panel B. The null hypothesis of the White's general test is equal error variances.

The null hypothesis of the modified Wald statistic for groupwise heteroskedasticity in Panel C is common error variance of cross-sections. The modified Wald statistic is workable (in asymptotic terms) when the assumption of normality is violated.

The null hypothesis of Wooldridge test for serial correlation in errors of linear panel-data models in Panel D is no first-order autocorrelation.

For figures in bold we reject the null hypotheses on chosen 5 percent level of significance.

Source: own calculations based on data from Bloomberg and Markit

Table 5 – Portfolio Betas and R-Squared

	MSCI World Index		MSCI Emerging Markets Index		Markit iBoxx EUR Liquid Corporates Bond Index		J.P. Morgan Emerging Bond Index	
	Beta	R-sq.	Beta	R-sq.	Beta	R-sq.	Beta	R-sq.
EUR denominated MIVs	-0.0200 ***	4.29%	-0.0145 ***	4.25%	-0.0691 **	3.09%	-0.0343 ***	3.43%
USD denominated MIVs	-0.0145	0.85%	-0.0115 *	1.25%	-0.1092 ***	3.85%	-0.0338 *	1.28%

Notes: Equation 1 is estimated using panel-corrected standard errors (PCSEs).
For each index there are estimates of the beta coefficient in the first column, */**/*** in the second column denote significance at 10%, 5% and 1% level. R-squared results are in the third column for each market benchmark.

Source: own calculations based on data from Bloomberg and Markit

Table 6 – Jensen's Alphas

	MSCI World Index		MSCI Emerging Markets Index		Markit iBoxx EUR Liquid Corporates Bond Index		J.P. Morgan Emerging Bond Index	
	Alpha		Alpha		Alpha		Alpha	
EUR denominated MIVs	0.22%	***	0.23%	***	0.24%	***	0.25%	***
USD denominated MIVs	0.28%	***	0.29%	***	0.30%	***	0.31%	***

Notes: Equation 1 is estimated using panel-corrected standard errors (PCSEs).
Jensen's alpha estimates are expressed in percentage revealing the added monthly return of microfinance funds compared to its theoretical expected return implied by the CAPM that compensate an investor for the systematic risk measured by beta. Levels of significance are for each index in the second column – */**/*** denote significance at 10%, 5% and 1% level.

Source: own calculations based on data from Bloomberg and Markit

Table 7 – Mean-variance Spanning Test for MIVs over benchmark indices

	MSCI World Index	MSCI Emerging Markets Index	Markit iBoxx EUR Liquid Corporates Bond Index	J.P. Morgan Emerging Bond Index
	p-value	p-value	p-value	p-value
EUR denominated MIVs	**0.0000**	**0.0000**	**0.0000**	**0.0000**
USD denominated MIVs	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Notes: The table presents mean-variance spanning tests for EUR and USD denominated microfinance investment funds over four benchmark indices. The null hypothesis of spanning test is expressed as follows H_0: $\alpha_i = 0 \; and \; \beta_i = 1$, where α_i and β_i are regression coefficient estimated in equation 2. The test statistics have χ^2 distribution with 2 degrees of freedom and related p-values are reported in this table.

For figures in bold we reject on chosen 5 percent level of significance the null hypothesis that the mean-variance frontier of a combination of microfinance investment fund *i* and a benchmark index is spanned by the mean-variance frontier of the benchmark index.

Source: own calculations based on data from Bloomberg and Markit