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Abstract

International commercial banks, institutional investors, and private investors have become increasingly interested in financing microfinance institutions (MFIs). This paper investigates whether adding microfinance funds to a portfolio of risky international assets yields diversification gains. By using mean-variance spanning tests with short-sale constraints, the paper indicates that investing in microfinance may be attractive for investors seeking a better risk-return profile. More specifically, the analysis suggests that investing in MFIs from Latin America, or microfinance and rural banks may yield more efficient portfolios. In contrast, adding MFIs from Africa or microfinance NGOs to a benchmark portfolio of international assets does not seem beneficial for a mean-variance investor.

1. Introduction

About ten years ago, microfinance started to become more commercial, and this commercialization is increasing very strongly. Commercial banks in developed and developing economies play an increasing role in funding microfinance institutions. In Pakistan, for instance, a number of private commercial banks have moved into microfinance. In Malaysia, Nepal, and Thailand there are programs stimulating commercial banks to become involved in microfinance. In India the National Bank of Agriculture and Rural Development (NABARD) has recently initiated a program to involve private banks in microfinance. According to recent studies the growth of microfinance in India is led by a number of commercial banks such as ICICI and HSBC together with private venture capital funds and social venture capitalists (Lakshman, 2006; Iyer, 2006).

The commercialization of microfinance has also expanded the traditional services by MFIs. MFIs traditionally focus on microcredit, in the form of small loans to the poor. Currently there is a strong shift from microcredit to microfinance. This broader term reflects the fact that microfinance is not only about providing loans. MFIs also collect savings, provide insurance, and help to distribute and market clients' output (Armendáriz de Aghion and Morduch, 2005). Moreover, new banking technology, such as charge cards, ATMs, the use of cell phones and the internet has begun to enter the microfinance business, helping to reduce costs and improve the delivery of services.

The funding situation of MFIs also starts to change rapidly. Traditionally, microfinance institutions are mainly funded by private and public donors and aid organizations. Recently, international commercial banks and investors have become increasingly interested in financing MFIs. There is an increase in MFIs for which capital market funding becomes important (see Swanson, undated). The first example of commercial

capitalization of MFIs was the creation of an investment fund called Profund, which raised $23 million to finance Latin American MFIs. In 2006, private investment funds, also known as microfinance investment vehicles (MIVs) held portfolios of MFIs' shares with a total value of $2.3 billion (CGAP, 2007).

Some microfinance institutions have even gone public, and became commercial banks. The most well-known example is Compartamos in Mexico. Compartamos started in 1990 as a standard MFI by providing joint-liability loans to female borrowers. In 1998 Compartamos became a regulated financial institution, a so-called Sociedad Financiera de Objeto Limitado (SFOL). In 2002 Compartamos, as one of the first MFIs, issued public debt. In April 2007 Compartamos went public and transformed itself into a commercial bank. Driven by increasing access to commercial funding sources, the volume of microfinance loans has risen sharply in recent years, from an estimated USD 4 billion in 2001 to approximately USD 25 billion in 2006 (Deutsche Bank Research, 2007).

Since most MFIs are not deposit-taking institutions and since domestic capital markets are thin, international capital markets will become more and more important for the future funding of MFIs. In the 2004-2006 period, foreign investment in Microfinance already more than doubled, from USD 1.7 billion to around USD 4.4 billion (Deutsche Bank Research, 2007). Approximately 50 percent of the funding of foreign capital to MFIs is channeled through specialized Microfinance Investment Vehicles (MIVs). The number of MIVs have increased rapidly and there are now over 80 in existence MIVs. The main investors in MIVs are individual investors. The share of international financial institutions in MIV funding has declined from 36 percent in 2005 to 30 percent in 2006, while institutional investors are catching up. Since 2004 institutional investors have been expanding their interest in the microfinance industry. There is especially an increasing interest from pension funds to invest

in microfinance. An example is the launching of the Institutional Microfinance Fund of the Dutch retail bank SNS, which is almost entirely funded by Dutch pension funds.

To some extent the trend of increasing interest of private and institutional investors for microfinance can be explained by the increased attention for socially responsible entrepreneurship. However, institutional and private investors are also attracted by the high returns provided by some microfinance institutions. Moreover, as is argued by e.g. Krauss and Walter (2008), microfinance may provide attractive opportunities for portfolio diversification since the risk adjusted returns exhibit low correlations with other assets. This low correlation may be due to the fact that many clients of microfinance institutions are part of the informal economy, which is less sensitive to macroeconomic cycles. This suggests that investing in microfinance could offer diversification benefits to (institutional) investors seeking to reduce their portfolio volatility. In the academic literature, however, we find surprisingly little rigorous testing of this issue.

This paper investigates whether adding microfinance funds to a benchmark portfolio of international assets is beneficial for investors by using a mean-variance spanning test. This methodology has been used in several seminal papers studying benefits of international diversification, especially in the context of emerging markets, see e.g. Bekeart and Urias (1996), and De Roon, Nijman, and Werker (2001). The spanning methodology has recently also been used to analyze the harmonization of fiscal and economic policy within the European Monetary Union, see Moerman (2008). We are the first using mean-variance spanning tests to examine benefits of investing in MFIs.

The mean-variance spanning methodology allows us to study whether adding microfinance to a benchmark set of risky assets improves the risk-return profile for investors. Since it is not possible to go short in microfinance, we apply a spanning test with short-sale constraints, based on De Roon, Nijman and Werker (2001). We will apply the spanning test to

all MFIs for which data are available, for MFIs from different regions, and for different types of MFIs. This analysis helps investors willing to invest in MFIs to determine in which MFIs they should invest.

The few papers that deal with benefits of investing in microfinance only consider correlations between financial indicators of MFIs. In our view, the methodology used in other papers is too restrictive. The advantage of the spanning methodology is that it provides a much better indication of possible diversification benefits of microfinance since this methodology simultaneously considers risk and return.

The paper is organized as follows. Section 2 summarizes the existing literature on possible diversification benefits of investing in microfinance. Section 3 and section 4 explain the methodology and the data we use, respectively. Section 5 presents the regression results. Section 6 concludes, and suggests some areas for further research.

2. Literature Survey

There are only a few papers available which provide some evidence on the possible attractiveness of microfinance for investors. The main examples are: Ahlin and Lin (2006), Gonzalez (2007), and Krauss and Walter (2008). These papers, using different versions of the MixMarket dataset, examine whether microfinance shows low sensitivity to the macroeconomy. Whereas Ahlin and Lin (2006), and Gonzalez (2007) empirically address the question of MFI resilience to domestic macroeconomic shocks, Krauss and Walter (2008) deal with domestic and international shocks.

Ahlin and Lin (2006) use a sample of 112 MFIs from 48 countries for the years 1996-2004. By using within and between panel regressions, they examine whether performance of MFIs is affected by the macroeconomy. They focus on four performance measures: self-sustainability, default rates, costs per borrower, and growth in clientele. Concerning the

macroeconomic variables, they use real per capita income growth rates, inflation, labor force participation rates, manufacturing's share in GDP and net foreign direct investment as a fraction of GDP. Their study indicates that the macroeconomic environment is a significant determinant of MFI performance, which questions the relevance of investments in microfinance in order to reduce portfolio risk. However, they also show that MFI success is for a substantial part determined by MFI-specific factors.

Gonzalez (2007) analyzes whether changes in domestic GNI per capita significantly affect MFI portfolio risk, measured by four indicators: Portfolio at Risk over 30 days, Portfolio at Risk over 90 days, Loan loss Rate, and Write-off Ratio. His sample contains 639 MFIs in 88 countries for the period 1999-2006. By using fixed and random effects panel regressions, in which he controls for several variables that may affect portfolio risk, the study shows that only with respect to Portfolio at Risk over 30 days there exists a statistically significant relationship between changes in GNI per capita and portfolio risk of MFIs. Regarding the other three indicators for portfolio risk, he finds no evidence for a relationship between MFI asset quality and changes in GNI per capita, suggesting that microfinance portfolios have high resilience to macroeconomic shocks. His study, therefore, provides some evidence that microfinance may provide attractive opportunities for portfolio diversification.

Krauss and Walter (2008) examine whether microfinance shows low correlation with international and domestic market performance measures. Their dataset contains annual data for the period 1998-2006. In total they consider 325 MFIs based in 66 emerging market countries. They use fixed-effects panel regressions to examine the relationship of MFI returns, measured by five key financial variables (return on equity, profit margin, change in total assets, change in gross loan portfolio and loan portfolio at risk), to global market risk – measured by the S&P 500, Morgan Stanley Capital International (MSCI) world, and MSCI Emerging Markets indexes – and domestic market risk, measured by domestic GDP. Krauss

and Walter (2008) also perform regressions for a sample containing MFIs and emerging market institutions (EMIs), and MFIs and emerging market commercial banks (EMCBs). These regressions aim to show whether MFIs show lower or higher correlations with domestic and global market risk than EMIs or EMCBs. Their analysis shows that MFIs are not correlated with global market movements, whereas MFIs are significantly correlated with the domestic macroeconomy. Relative to EMIs and EMCBs, MFIs seem to be more detached from global capital markets. However, concerning the domestic markets, MFIs and the two benchmarks have comparable correlations. This leads Krauss and Walter (2008) to conclude that "MFIs may have useful diversification value for international portfolio investors away from country risk exposures. For emerging market domestic investors, who may have this ability to a much more limited extent, domestic microfinance investments do not seem to provide significant portfolio diversification advantages" (Krauss and Walter, 2008, p. 24).

Apart from the correlation argument, another straightforward argument in favor of adding microfinance to a portfolio is that microfinance can offer investors a high return for only little risk. However, there are large performance differences between MFIs. Stephens and Tazi (2006), for instance, show that return on assets performance differs substantially between regions. While Latin American and Eastern European and Central Asian MFI's perform quite well, Southern Africa and South Asian MFI's perform worse. In addition, performance seems to differ between types of MFIs, e.g. commercially oriented banks perform better than aid oriented Non-Governmental Organizations (NGOs).

3. Methodology

In contrast to the papers reviewed in the previous section, we use mean-variance spanning tests to test whether investors can benefit from investing in microfinance. See De Roon and Nijman (2001) for a survey of mean-variance spanning. The mean-variance framework relies

on the assumption that investment decisions of investors are solely made on the basis of the mean-variance properties of assets. Where the beta in a CAPM model merely informs us about the correlation between an asset and the market portfolio, a mean-variance spanning test is much more informative. Instead of relying on simple correlations, a spanning test is able 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. By assumption, portfolios that are on the efficient frontier are mean-variance efficient. This means that these portfolios have the highest return for a given variance of all possible portfolios. Put differently, they have the lowest variance for a given level of return of all possible portfolios.

Huberman and Kandell (1987) were the first to suggest a multivariate test of the hypothesis that the minimum-variance frontier of a set of K benchmark assets is the same as the minimum-variance frontier of the K assets plus a set of N test assets. However, the spanning test of Huberman and Kandell (1987) assumes that short sale constraints are absent. Since it is impossible to go short in microfinance, the spanning test of Huberman and Kandell (1987) is not appropriate for our case. Therefore, we use the spanning test with short-sale constraints proposed by De Roon, Nijman, and Werker (2001). We assume that short-sale constraints are only imposed on the test asset (microfinance) but not on the benchmark portfolios. We use the same testing procedures as in De Roon, Nijman, and Werker (2001). For details, we refer to their article.

Usually the spanning methodology is applied to a portfolio of assets. However, since data on MFIs are only available on a yearly basis for the period 1997 to 2007, we use the return on individual MFIs to perform spanning tests based on a panel. It can be shown that a properly defined average model (a model based on portfolios) follows directly from the panel data model, implying that the coefficients should *in theory* be the same.[1]

In short, we run the following pooled panel regression;

$$R_{2t,i} = \alpha + \beta R_{1t,i} + u_{t,i} \qquad t = 1....T \quad i = 1....M \tag{1}$$

where at time t the test asset returns and benchmark returns are given by the K- and N-dimensional vectors $R_{2t,i}$ and $R_{1t,i}$, respectively. In our case, the test asset is the return on a set of MFIs. So we restrict ourselves to the case of $N = 1$. The test amounts to testing

$$\begin{aligned} \boldsymbol{\alpha} + (\boldsymbol{\beta}\boldsymbol{\iota}_K - 1)\eta_{\min} \leq 0 \\ \boldsymbol{\alpha} + (\boldsymbol{\beta}\boldsymbol{\iota}_K - 1)\eta_{\max} \leq 0 \end{aligned} \tag{2}$$

where η is the risk-free rate and ι_K is a K-vector of ones. So we test intersection under short sales constraint for a minimum and a maximum value of the risk free rate. The chosen minimum and maximum values of the risk free rate are zero and the expected return on the global minimum variance portfolio of the benchmark assets, respectively.[2] If intersection is rejected, it will also be rejected for all intermediate values of the risk free rate, which implies a rejection of spanning. We can test (2) by calculating the test statistic suggested by Kodde and Palm (1986)

$$\xi(\eta) = \min \ (\hat{\boldsymbol{\alpha}}_J - \boldsymbol{\alpha}_J)' Var[\hat{\boldsymbol{\alpha}}_J(\eta)]^{-1} (\hat{\boldsymbol{\alpha}}_J - \boldsymbol{\alpha}_J), \ \text{ s.t. } \hat{\boldsymbol{\alpha}}_J \leq 0 \tag{3}$$

where $\hat{\alpha}_J$ and α_J are the restricted and unrestricted estimates of Jensen's alpha, respectively. The test statistic is asymptotically chi-square distributed with 2 degrees of freedom. Its distribution is given in Kodde and Palm (1986). We determine probabilities using numerical simulation, as proposed by Gouriéroux, Holly, and Montfort (1982).

4. Data

Our dataset contains annual data on MFIs covering the period 1997 to 2007, and is publicly available data from MixMarket (www.mixmarket.org). All numerical data are converted to US dollars at contemporaneous exchange rates. MFIs can voluntarily participate in the MixMarket database, but data entry is closely monitored by MixMarket. Participants have to enclose documentation that supports the data, such as audited financial statements and annual

reports. In order to be able to provide such data, reporting MFIs should have an adequate information infrastructure. Therefore, the MixMarket database probably represents a random sample of the best managed MFIs in the world (Kraus and Walter, 2008; Gonzales, 2007).

The data reported by MixMarket is not adjusted for subsidies. As noted by Kraus and Walter (2008), from an investor perspective MFI subsidies can be compared to a too-big-to-fail (TBFT) support for commercial banks. However, the frequency and size of these subsidies is not certain and thus constitutes an investment risk. Unfortunately, we are not able to account for this risk in the present study. Finally, the number of MFIs has grown explosively over the last eleven years. In 1997 there are only about 25 MFIs in our dataset, while in 2006 there are already 800 MFIs in our portfolio. Therefore, the dataset may suffer from some attrition bias.

Since MFIs are not actively traded and hence have no market returns, we have to rely on return measures based on accounting earnings to estimate an *accounting* alpha and beta. That is, we use return on equity (ROE) and return on assets (ROA) to proxy for MFI market returns. This approach has the obvious disadvantage that it forces us to compare backward-looking accounting returns with forward looking stock returns (i.e. the benchmark). However, Karels & Sackley (1993) analyze the relationship between market betas and accounting betas in the US banking industry and have found significant correlations. In addition, in the short run, returns from MFI investment are based on past performance, e.g. from interest or dividend payments. Any gain investors obtain from ultimately selling their stake can unfortunately not be incorporated in our tests.

To mimic an (institutional) investor's broad investment portfolio we use global equity and bond indexes. The equity indexes we use to compute returns are the Morgan Stanley Capital International (MSCI) world and emerging markets total return indexes, which have also been used by Kraus and Walter (2008). The bond indexes we use are the JP Morgan

Global Broad and JP Morgan Emerging Markets Global Composite indexes. All indexes are in US dollars and obtained from Thomson Datastream.

We will first apply the spanning test to all MFIs for which data are available. Next we will apply the spanning test to MFIs from different regions. That is, we make selections of MFIs from Africa, East Asia and the Pacific, Eastern Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa and South Asia. Finally, we will perform spanning tests for different types of MFIs, i.e. Banks, Credit Unions/Cooperatives, Non-profit (NGOs) and Rural Banks. Summary statistics of all MFIs and the different selections of MFIs are displayed in Table 1.

[INSERT TABLE 1 ABOUT HERE]

5. Empirical results

Table 2 gives results of our spanning tests for the different regions and the entire sample of MFIs. Panel A provides the results for MFI return on equity and panel B provides the results for MFI return on assets. Looking at the results on all regions, using all four benchmarks, we see that spanning is rejected at the 1% level for return on equity and at the 10% level for return on assets. For return on assets, spanning is only rejected if we add the JP Morgan Global to the set of benchmarks. Also for return on equity spanning is often more convincingly rejected for bond benchmarks than for stock benchmarks. This suggests that a microfinance investment is particularly valuable as addition to the bond share of a globally diversified portfolio.

[INSERT TABLE 2 ABOUT HERE]

Looking at the results per region, we see that spanning is never rejected for Africa. Both in terms of return on assets and return on equity Africa is the worst performer in our sample. From the Microfinance Information Exchange (2006) we can identify three reasons for the relatively poor performance of African MFIs compared to other regions. First, African

MFIs have higher operating costs due to the weak infrastructure of African countries combined with the rural markets in which they operate and the high labor costs they face. Second, some African MFIs are subject to interest rate ceilings, which prevents them from earning back their higher operating costs. These are MFIs operating in the WAEMU countries[3], Namibia, South Africa and Guinea (Microfinance Information Exchange, 2008). Third, in Southern Africa there are several high-inflation economies which face higher financial expenses. Also for Middle-East and North Africa, spanning is almost never rejected. Adding MFIs from Eastern Europe and Central Asia could improve a bond portfolio, in particular the JP Morgan Global bond portfolio. For East Asia and the Pacific spanning is always rejected for return on equity, but never rejected for return on assets. To some extent, we see this discrepancy between the results for return on equity and return on assets also for South Asia. A possible explanation could be that the median debt-to-equity ratio is the highest for East Asia and the Pacific and South Asia. This inflates (deflates) their return on equity (return on assets). Finally, for Latin America spanning is almost always rejected, which makes it the most attractive region to invest in from a diversification perspective.

[INSERT TABLE 3 ABOUT HERE]

The results of spanning tests per type of MFI are displayed in Table 3. We see that spanning is always rejected at the 10% level for banks. This is not surprising, since banks are the most profit-oriented MFIs. Moreover, for rural banks spanning is always rejected at the 1% level. Of all types of MFIs they are the best performers in our dataset, having a high mean return and only a small variance. For Cooperatives / Credit Unions, Non-bank Financial Institutions and NGOs we reject spanning only for some indexes.

6. Conclusions

This paper uses mean-variance spanning tests to examine whether it is attractive for investors to add microfinance to their portfolio of risky assets. The analysis suggests that, in general,

MFIs can be a valuable addition to a broad portfolio of stocks and bonds. This is a remarkable result, especially if compared to investing in emerging markets, to which investing in microfinance is often compared (see e.g. Kraus and Walter, 2008). De Roon, Nijman and Werker (2001) show that, accounting for short sales restrictions, investors will not benefit from including emerging markets in their portfolio. Our analysis suggests that international investors can benefit from including microfinance in their well-diversified portfolio, even if short-sales restrictions are taken into account. Especially when microfinance is seen as part of the bond share of this portfolio, investing in MFIs seems to be an attractive investment. In fact, many institutional investors invest in microfinance by means of a fixed income investment. Equity finance still constitutes a minor part of microfinance funding.

When we distinguish between different regions, investing in MFIs from Latin America improves the mean-variance frontier almost always, regardless of the benchmark. Conversely, investing in MFIs from Africa never improves the mean-variance frontier. When we distinguish between different types of MFIs, we find that we can reject spanning almost always for banks and rural banks. In particular for rural banks spanning is very convincingly rejected. Conversely, we reject spanning much less for NGOs, Non-bank financial institutions and Cooperatives / Credit Unions.

These results have some clear implications for private and institutional investors. In general our analysis suggests that microfinance can provide an attractive investment opportunity EVEN if investors are only interested in risk and return. If it is taken into account that microfinance also has a social aim, and if this is valued by investors, investing in microfinance even becomes more attractive. However, our analysis also indicates that it is more attractive for microfinance investors to invest in Latin America than in Africa. These investors are also more likely to invest in microfinance banks than in NGOs. Moreover, the analysis suggests that it is especially attractive to add MFIs to the debt part of the portfolio.

The analysis in this paper has some limitations. We have already pointed at some of these limitations: MFIs are not actively traded and hence have no market returns, so that we have to rely on return measures based on accounting earnings; the data is not adjusted for subsidies, and most importantly, we only have data for 11 years. The latter makes analyses on portfolios unreliable. It is therefore highly important that databases on MFIs' financial variables are developed, which can be used in future research on the attractiveness of microfinance for private and institutional investors. Another possible drawback concerns the limitations of spanning tests. The mean-variance framework relies on the assumption that investment decisions of investors are solely based on the mean-variance properties of assets. In practice, also other characteristics of microfinance may play a role, such as its reputation as a socially responsible investment. Despite these drawbacks we are confident that our analysis provides a valuable first attempt to examine the attractiveness of MFIs for private and institutional investors.

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TABLES

Table 1 – Summary Statistics

Panel A - Microfinance Returns	Number of MFIs	MFI Return on Equity		MFI Return on Assets		Median D/E-ratio
Regions		Mean	Std. Dev.	Mean	Std. Dev.	
Africa	781	0.048	4.931	-0.031	0.172	1.986
East Asia & the Pacific	377	0.094	0.414	0.008	0.123	2.638
Eastern Europe & Central Asia	645	0.082	0.626	0.040	0.125	1.126
Latin America	918	0.078	0.623	0.018	0.168	2.542
Middle East & North Africa	154	0.086	0.614	0.017	0.088	0.359
South Asia	515	0.242	3.484	-0.019	0.151	5.493
All regions	3390	0.099	2.767	0.004	0.154	2.216
Type of MFI						
Bank	286	0.194	0.718	0.028	0.069	5.345
Cooperative / Credit Union	487	0.311	6.066	0.017	0.085	3.422
Non-bank Financial Institution	957	0.038	0.754	0.013	0.192	1.873
Non-profit (NGO)	1422	0.051	2.227	0.009	0.320	1.385
Rural Bank	151	0.194	0.133	0.033	0.026	5.694

Panel B - Benchmark Returns	Mean	Std. Dev.
MSCI world	0.097	0.182
MSCI emerging markets	0.163	0.330
JPM global	0.063	0.087
JPM emerging markets	0.107	0.101

In this table we report descriptive statistics on Microfinance returns for regions and types of MFIs. We report the number of MFIs, the mean and standard deviation of yearly MFI return on equity and return on assets. Finally, we report the median debt-to-equity ratio (D/E-ratio). The benchmark stock indexes are (1) MSCI world: the Morgan Stanley Capital International developed markets stocks index and (2) MSCI emerging markets: the Morgan Stanley Capital International developing markets stocks index. The benchmark bond indexes are (1) JPM global; the JP Morgan Global Broad and (2) JPM emerging markets; JP Morgan Emerging Markets Bond Index Global Composite. For these benchmark returns we also report the mean and standard deviation of yearly returns. All returns are denominated in US dollar and the period covered for all returns is 1997-2007.

Table 2 - Spanning Tests by Region

Benchmark	Afr.	EA & P	EE & CA	LA	ME & NA	SA	All
Panel A: Return on equity							
MSCI world	0.002	7.478	0.203	9.130	2.620	4.721	6.527
	(0.943)	(0.007)	(0.614)	(0.003)	(0.107)	(0.035)	(0.012)
MSCI emerging markets	0.017	8.996	0.000	11.362	1.465	2.235	4.993
	(0.872)	(0.003)	(0.888)	(0.001)	(0.227)	(0.151)	(0.030)
MSCI world & emerging markets	0.112	9.367	0.010	11.220	1.214	2.115	4.379
	(0.734)	(0.003)	(0.862)	(0.001)	(0.271)	(0.149)	(0.038)
JPM global	0.273	7.196	11.301	8.661	4.332	1.766	5.141
	(0.595)	(0.008)	(0.001)	(0.004)	(0.039)	(0.188)	(0.025)
JPM emerging markets	0.460	15.081	2.225	19.591	2.374	4.397	7.475
	(0.492)	(0.000)	(0.141)	(0.000)	(0.127)	(0.045)	(0.007)
JPM global & emerging markets	0.485	13.642	1.681	13.073	2.542	4.890	8.309
	(0.481)	(0.000)	(0.199)	(0.001)	(0.114)	(0.030)	(0.004)
All stocks & bonds benchmarks	0.504	13.655	1.804	11.643	2.145	3.320	8.240
	(0.474)	(0.000)	(0.184)	(0.001)	(0.145)	(0.072)	(0.005)
Panel B: Return on Assets							
MSCI world	0.000	0.278	7.755	2.403	1.561	0.000	0.133
	(0.932)	(0.571)	(0.007)	(0.125)	(0.214)	(0.896)	(0.676)
MSCI emerging markets	0.000	0.261	2.123	3.675	0.002	0.000	0.088
	(0.904)	(0.576)	(0.153)	(0.059)	(0.856)	0.869	(0.708)
MSCI world & emerging markets	0.000	0.289	2.709	3.507	0.000	0.000	0.153
	(0.971)	(0.567)	(0.103)	(0.065)	(0.964)	(0.931)	(0.669)
JPM global	0.000	1.348	40.830	5.568	2.576	0.000	4.489
	(0.924)	(0.247)	(0.000)	(0.019)	(0.112)	(0.939)	(0.036)
JPM emerging markets	0.000	1.314	8.117	3.441	0.605	0.000	2.230
	(0.819)	(0.254)	(0.006)	(0.069)	(0.412)	(0.873)	(0.144)
JPM global & emerging markets	0.000	1.523	7.791	4.398	0.580	0.000	3.104
	(0.839)	(0.223)	(0.007)	(0.040)	(0.430)	(0.873)	(0.086)
All stocks & bonds benchmarks	0.000	1.352	4.829	3.362	0.131	0.000	2.945
	(0.872)	(0.248)	(0.032)	(0.072)	(0.683)	(0.898)	(0.093)

In this table we report the results of our mean-variance spanning tests, where short sales restrictions are imposed on the MFI returns that are added to the benchmark returns. The benchmark stock indexes are (1) MSCI world: the Morgan Stanley Capital International developed markets stocks index and (2) MSCI emerging markets: the Morgan Stanley Capital International developing markets stocks index. The benchmark bond indexes are (1) JPM global; the JP Morgan Global Broad and (2) JPM emerging markets; JP Morgan Emerging Markets Bond Index Global Composite. In panel A, we report the results of our spanning tests when we use MFI return on equity as proxy for MFI returns. In panel B, we report the results of using return on assets. We report Wald statistics and p-values between brackets. Here Afr. Indicates Africa, EA & P indicates East Asia and the Pacific, EE & CA indicates Eastern Europe & Central Asia, LA indicates Latin America, ME & NA indicates Middle East & North Africa and SA indicates South Asia. Finally, All indicates that we test spanning for the entire set of regions.

Table 3 - Spanning Tests by Type of MFI

Benchmark	Banks	Cooperative / Credit Union	Non-bank Financial Institution	Non-profit (NGO)	Rural Bank
Panel A: Return on equity					
MSCI world	13.285	1.029	0.469	3.217	54.858
	(0.000)	(0.310)	(0.487)	(0.078)	(0.000)
MSCI emerging markets	4.046	0.771	2.875	1.770	32.232
	(0.053)	(0.376)	(0.096)	(0.193)	0.000
MSCI world & emerging markets	3.806	0.975	4.525	1.441	40.562
	(0.053)	(0.323)	(0.035)	(0.231)	(0.000)
JPM global	14.211	2.153	1.844	0.832	157.043
	(0.000)	(0.143)	(0.179)	(0.356)	(0.000)
JPM emerging markets	5.173	1.552	0.000	7.609	55.002
	(0.030)	(0.214)	(0.934)	(0.008)	(0.000)
JPM global & emerging markets	5.804	1.500	0.000	8.864	57.635
	(0.019)	(0.221)	(0.936)	(0.004)	(0.000)
All stocks & bonds benchmarks	5.162	1.497	0.017	7.289	56.853
	0.026	(0.222)	(0.786)	(0.008)	(0.000)
Panel B: Return on Assets					
MSCI world	7.209	2.757	0.952	0.000	69.005
	(0.008)	(0.102)	(0.327)	(0.911)	(0.000)
MSCI emerging markets	6.320	1.359	0.193	0.000	54.977
	(0.013)	(0.246)	(0.622)	(0.894)	0.000
MSCI world & emerging markets	6.579	4.368	0.262	0.000	60.442
	(0.011)	(0.038)	(0.593)	(0.931)	(0.000)
JPM global	7.245	26.674	5.521	0.000	92.360
	(0.007)	(0.000)	(0.020)	(0.940)	(0.000)
JPM emerging markets	6.928	12.193	0.112	0.658	42.229
	(0.009)	(0.001)	(0.683)	(0.396)	(0.000)
JPM global & emerging markets	6.091	10.742	0.160	1.331	43.413
	(0.015)	(0.001)	(0.647)	(0.251)	(0.000)
All stocks & bonds benchmarks	6.452	16.870	0.061	1.127	43.376
	(0.012)	(0.000)	(0.749)	(0.287)	(0.000)

In this table we report the results of our mean-variance spanning tests, where short sales restrictions are imposed on the MFI returns that are added to the benchmark returns. The benchmark stock indexes are (1) MSCI world: the Morgan Stanley Capital International developed markets stocks index and (2) MSCI emerging markets: the Morgan Stanley Capital International developing markets stocks index. The benchmark bond indexes are (1) JPM global; the JP Morgan Global Broad and (2) JPM emerging markets; JP Morgan Emerging Markets Bond Index Global Composite. In panel A, we report the results of our spanning tests when we use MFI return on equity as proxy for MFI returns. In panel B, we report the results of using return on assets. We report Wald statistics and p-values between brackets.

[1] The main difference between the two approaches concerns the standard errors. The advantage of the panel approach is that the larger sample allows us to use asymptotic tests. However, for a larger sample, the probability of rejecting any statistical test, and thus also the spanning test, is higher (Granger, 1998).

[2] These values are also used by De Roon, Nijman and Werker, 2001. Note that they use gross returns, while we use net returns.

[3] West African Economic and Monetary Union (WAEMU) countries include Benin, Burkina Faso, Cotê d'Ivoire, Mali, Niger, Senegal and Togo.