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From NGOs to banks: Does institutional transformation alter the business model of microfinance institutions?

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Abstract

Microfinance, which pledges to provide financial services to people without access to banking, is chiefly run by non-governmental organizations (NGOs). Little is known about the extent to which the transformation of these NGOs into shareholder-owned and, most often, regulated firms affects the way microfinance institutions (MFIs) conduct their business. By applying the event study methodology to 66 MFIs that have transformed, we quantify the effect that transformation has on the MFIs' business models. Our results suggest that portfolio yield is driven down by 3.9 percentage points due to transformation, indicating that clients get more favorable interest rates. At the same time, MFIs are able to significantly cut down their operational expenses, of which 1.1 percentage points can be attributed to transformation. Other findings include a steep increase in commercial debt leverage and deposits, a significant decrease in the fluctuation of funding costs and a sharp rise in average loan size. Profitability goes down in the short and medium term, while return on equity is driven up in the medium to long run. By exploiting within-MFI data, our approach goes beyond previous studies that mainly relied on between-MFI data. Overall, the results suggest that transformed MFIs become an attractive environment for investors, potentially encouraging a more profit-seeking behavior among transformed MFIs.

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1. Introduction

Microfinance pledges to provide financial services to people without any access to banking. At the peak of public attention, roughly a decade ago, the microfinance movement was enthusiastically embraced by policymakers around the world, whereas in the aftermath of crises in oversaturated markets, concerns arose that profit-seeking behavior among microfinance institutions (MFIs) might harm their clients rather than benefit them (Dichter and Harper, 2007; Guérin et al, 2015). Today it is acknowledged that microfinance *can* have a positive impact on poor people's incomes, albeit to a lesser extent than previously hoped by many.[1]

The global microfinance sector has continued growing regardless, though it has undergone structural changes. Initially a purely philanthropic idea, microfinance started out in the 1970s as a not-for-profit activity sponsored by donors. However, since PRODEM in Bolivia was transformed into the regulated bank BancoSol in 1992, the received wisdom is that MFIs will follow a natural evolutionary process and transform from non-governmental organizations (NGOs) into financial institutions (von Pischke, 1996). While the bulk of MFIs today are still NGOs and heavily depend on subsidies (D'Espallier et al., 2013), several NGO-MFIs have already transformed into banks or other kinds of regulated non-bank financial institutions (NBFIs). Transformed NGO-MFIs include regional leaders such as Banco Compartamos in Mexico, Banco FIE in Brazil or Bandhan and SKS in India, which are among the largest MFIs in the world.

The transformation process implies moving to a shareholder ownership structure; and most often it also includes becoming subject to prudential regulation by national banking authorities. In this paper we investigate how transformation affects an MFI's business model by focusing on its main cost and income components, funding structure, services offered and average loan sizes.

The arguments for transformation are manifold, including: the importance of becoming independent from donors, better access to commercial funding, an improved governance structure and the possibility to provide clients with savings accounts (Frank, 2008; Mersland, 2009). However, some argue that commercialization and transformation tend to push MFIs away from their mission of

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[1] A recent series of six in-depth studies on the impact of microfinance in different geographic settings using experimental methods, as summarized by Banerjee et al (2015), presents new evidence of the limited impact of microfinance in lifting the poor out of poverty in the short to medium term.

serving the poor (Dichter and Harper, 2007). For example, studies such as Chahine and Tannir (2010) and Wagenaar (2014) suggest that transformed MFIs increase the size of their loans and tend to serve a lower percentage of women.

Our paper aims to make a threefold contribution to the existing empirical literature on MFI transformation. First, while the impact on social performance has frequently been studied, we looked at the impact of transformation on the overall business model of MFIs. This comprises all the cost and income components (the MFIs' profit function), the decision whether to offer savings products, the funding structure of MFIs and the scale of their operations. By investigating the business impact of transformation we sought to shed light on the question whether transformation is indeed a useful option for MFIs to increase their financial viability, as is often proclaimed. This is a constantly relevant concern for an industry that does not regard itself as a "charity", yet is still largely financed by donations.

Second, the few empirical papers on transformation that are available have mainly exploited *between-MFI* information and compared transformed with untransformed organizations. The drawback of such an approach is the difficulty in controlling for unobserved differences between transformed and untransformed counterparts, especially since transformed MFIs typically make up only a very small part of the overall investigated sample. In order to better isolate the effects of transformation, we employed an event study methodology relying mainly on *within-MFI* information. Arguably, this methodology is better suited to documenting the changes caused by transformation; it is frequently used both in the finance literature (MacKinlay, 1997) and in the development literature (McIntosh et al., 2011).

Third, we went beyond investigating effects at the mean, by looking at trends in variables before and after transformation along their distribution. More precisely, we assessed whether different segments of the distribution (such as well performing vs. low performing MFIs prior to transformation) were affected differently after transformation.

Three main results stand out of our analysis. Firstly, the results of our study show that nominal portfolio yield, a proxy for interest rates charged, fell by 5.9 percentage points (from 39.5% to 33.6%) on average after transformation. Correcting for the overall declining trend, we attribute 3.9 percentage

points in the decrease of interest rate to transformation itself. This suggests that clients were offered more favorable interest rates after transformation.

Secondly, MFIs achieved substantial efficiency gains after transformation through an average reduction in operational costs of almost 10 percentage points, of which we estimate at least 1.1 percentage points were due to transformation.

Thirdly, transformation was followed by reduced volatility in funding costs as well as in overall profits, indicating that MFIs sought to decrease their operational risks, in part to comply with regulations imposing stricter risk management. We noted a boost in debt leverage, which is associated with decreasing returns on assets and less operational self-sufficiency, and a rise in return on equity in the medium run, which is the most relevant profitability measure from an investor's point of view. Besides, MFIs at the lower end of the self-sustainability scale during their NGO period were able to increase their operational self-sufficiency after transformation.

Further results include a continued growth in the loan portfolio, which is largely financed by a large increase in commercial funds whereas donations and subsidized debt go down. The expansion of the loan portfolio was a result of both reaching out to more customers and of issuing larger loans on average.

We conjecture that MFIs transform in order to take advantage of economies of scope and scale, and to tap into debt and deposit markets. Lower interest rates for clients were achieved by cutting operational costs but also by offering larger loans, which may have entailed a potential shift towards wealthier clients, such that mission drift cannot be ruled out.

The remainder of the article is structured as follows: Section 2 reviews the literature on institutional transformation in microfinance and the reasons why MFIs transform; Section 3 presents the methodology and describes the MFI dataset that was employed; Section 4 reviews the empirical results, and Section 5 provides some conclusions.

2. Institutional Transformation in Microfinance

2.1 Transformation as a profound, country-specific process

Following Fernando (2004) we define MFI transformation as a shift from NGO to shareholder firm. It should be noted that this does not bar the NGO from being a shareholder of the transformed MFI. In most cases a transformed MFI will also become regulated by national banking authorities. The shareholder-owned financial institution may be a regular bank, but also one of several types of NBFIs, which are similar to banks but have different limitations to their operations and services.

This definition seems to be clear-cut; it emphasizes the date on which the NGO status of an MFI legally ends and it starts operating as a formal financial institution, typically licensed by national banking authorities. In reality, however, transformation is a longer, more complex process that heavily depends on country-specific regulations. Thus, while many studies, including ours, consider the moment of transformation as a fixed point in time *t*, it actually requires extensive preparation; moreover it causes tensions and changes within the organization, both before and after legal transformation takes place. For example, Rosengard et al. (2000) document the transition of the formerly largest MFI in Kenya, K-Rep, from an NGO to a regulated financial institution. The authors report that the process took five years, from the initial decision in 1994 to obtaining a banking license in 1999. They describe the transformation as an "*extremely challenging process*" involving major strategic, operational and regulatory choices.

Frank (2008) notes that the transformation process impacts upon almost all organizational aspects of an MFI, including governance, capital structure, product design and regulatory environment. Hudon and Louche (2014), in their study of organizational changes induced by transformation in Kenya and Vietnam, observe that transforming MFIs struggle with redefinition of identity, redrawing the boundaries of the firm and issues of legitimacy. These challenges arise because MFIs are by nature hybrid institutions floating between two institutional logics, namely the social logic of poverty alleviation and the commercial logic of becoming self-sustainable (Randøy et al, 2015). Although this double bottom-line principle lies at the very heart of microfinance (Armendàriz and Morduch, 2010), many researchers doubt whether it is possible to achieve in the long run, and observe a potential trade-

off between social and financial objectives (Dehejia et al., 2012; Hermes et al., 2011). Other scholars believe that it is possible for MFIs to pursue this double logic and achieve success on both fronts (Morduch, 2000; Cull et al., 2007; Mersland and Strøm, 2010). What is certain, however, is that transformation is a profound process which forces MFIs to rethink their position with respect to both the financial and social logics and to strike a new balance between these possibly opposing goals.

The transformation process depends very much upon the local regulatory context in which it takes place. For instance, in Bangladesh, where transformation is subject to the Microfinance Regulatory Authority Act of 2006, the licensing statute imposes requirements on all licensed MFIs concerning the total loan portfolio, the number of borrowers and loan applications (Khalily et al., 2014). Further, it caps annual interest rates and demands strict monitoring procedures. In most countries (but not Bangladesh), national banking authorities demand that regulated institutions be either member-based (credit unions, savings and credit cooperatives) or shareholder-owned. Since NGOs by definition have no owners (Mersland, 2009), most regulators consider them unsuited as banks since neither the authorities nor the depositors have any recourse if the bank gets into distress. Mersland (2009) points out that a change in ownership type, from NGO to shareholder-owned, will in itself alter the MFI's governance system substantially, and is distinct from the impact of a change in regulation by public authorities.

2.2 Why do MFIs transform?

According to Frank (2008) transformation is driven by three main motives: *access* to commercial funds, product *expansion* and organizational *sustainability*. First, to fulfill their mission, i.e. reaching as many clients as possible, and to take advantage of economies of scale (Hartarska et al., 2013), MFIs generally wish to grow their loan portfolios, which requires access to capital (Périlleux et al., 2012). Since NGOs have no owners, they mainly have to rely on donor money and different kinds of subsidized funding (Hudon and Traca, 2011; Mersland and Urgeghe, 2013). Transformed MFIs, however, can open up to local and international investors and thereby broaden their financing mix. As a result, donor funds and subsidized borrowing can be supplemented with debt financing through

commercial loans and bonds, as well as equity financing in the form of privately or publicly held shares. International investors generally appreciate the increased transparency and mandatory reporting requirements that come with transformation into a regulated financial institution.

Some authors argue that increased access to international commercial funds is in fact a necessary precondition to become independent from donor money. According to Funk (2007) for instance, USD 30 billion is needed each year to effectively reach the poor through microfinance services, an amount almost impossible to raise exclusively through donor funds. Fernando (2004) argues that relying on donor money is a risky strategy since the amount of donations depends upon economic conditions in donor economies and can therefore be unstable and uncertain.

The second main reason for transforming is to mobilize savings, something that, in most countries, only regulated financial institutions are allowed to do. NGOs typically are only allowed to issue credit; they therefore remain "one-legged" credit institutions. Delgado et al. (2015) find that most MFIs enjoy economies of scope when holding savings alongside credit provision, and Awan (2009) highlights that savings can be a cheaper source of capital for MFIs. For instance, Rashid Bajwa, CEO of the largest Pakistani microfinance program, National Rural Support Program (NRSP), noted in an interview that "*if I borrow from commercial banks I have to pay up to 18 percent,... so deposit taking and thus transformation is a need, not a choice*" (Awan, 2009).

Offering savings accounts alongside credit is also important from a demand side perspective. Collins et al. (2010) demonstrate that even people with a very low income demand savings products; they typically lack safe places to deposit their savings, and often use alternative and informal ways to save. Well-designed savings products can help them manage their volatile daily cash flow and smooth their consumption. They may serve as a buffer in case of an unexpected income shock, and they can also be used to take advantage of economic opportunities. Furthermore, offering formal savings products can help overcome behavioral constraints, such as a lack of self-commitment. If savings are available at any time, they are easily spent for short-term consumption instead of being husbanded for their earmarked purpose (Dupas and Robinson, 2013).

The third reason to transform can be labeled 'organizational sustainability'. Some managers of MFIs launching the transformation process argue that integration into the formal financial system has

allowed many historical microfinance initiatives to survive over time (Mersland, 2011). Partly this is because regulators typically require institutions to comply with strict governance rules and also to have a long-term strategic plan. In some cases, MFIs may be driven by regulators to transform when they become a systemic risk for the sector due to their growth (Hudon and Louche, 2014). Regulation also allows for more control and hence better client protection. Therefore, in order to obtain a license, NGO-MFIs changing to a shareholder ownership structure install better corporate governance systems, improve their management structures and rethink their operational procedures to become more efficient. Even though these changes are demanding and require considerable efforts, they usually bring organizational stability in the long term. Labie (2001) notes that ineffective governance – mainly within NGOs – has led to resounding failures in the microfinance industry.

To sum up, whether motivated by the possibility of increased access to funding, or the opportunity to mobilize savings, or the wish to improve sustainability through regulation and ownership, transformation primarily seems to be an answer to an urge to professionalize and grow. This urge seems to be a logical response to fierce sectoral competition, both with newcomers and with commercial banks that are downscaling their activities towards microfinance[2] (Bell et al., 2002; Assefa et al., 2013) which, sometimes, is actively supported by government (as for instance in Malaysia, Nepal, and Thailand; Hermes et al., 2011).

2.3 Anecdotic empirical evidence concerning the business model of transformed MFIs

A number of studies analyze specific transformation cases or a sample of transformed MFIs within a country-specific setting. Rosengard et al. (2000) document the transformation of *K-Rep*, the once largest Kenyan microfinance program, into a regulated financial institution. Emphasizing the strategic and operational challenges faced during the process, the authors highlight the specificities of the microfinance business compared to the traditional financial sector and recommend four specific regulatory measures for microfinance: first, a higher minimum capital requirement due to higher volatility in financial revenue; second, an asset quality evaluation system taking account of the

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[2] For example, the two largest commercial Ecuadorian banks, Banco de Pichincha and Banco de Guayaquil, have sizeable microfinance departments.

typically non-traditional nature of collaterals; third, a minimum organizational structure allowing for continued proximity and quality of services to clients; fourth, stricter liquidity requirements to counter greater exposure to liquidity risk. Further, Rosengard et al (2000) argue that MFIs should be allowed to set interest rates freely, and that profitability should be measured in the same way as for other financial institutions in terms of return on assets (ROA) and return on equity (ROE). All recommendations were eventually implemented in 2006 by the State Bank of Kenya.

Awan (2009) documents the transformation of NRSP, the largest Pakistani microfinance scheme. The main recommendations for a smooth transition are a clear management structure, open communication and information distribution to both staff and clients, and contingency planning of the process. The study also emphasizes the importance of client-relationship building through proximity, openness and transparency, and the focus on trust and image.

Khalily et al. (2014) use stochastic frontier analysis to analyze the efficiency *pre-* and *post-*transformation of 182 licensed MFIs in Bangladesh. Their main finding is that transformation reduces cost-inefficiencies thanks to higher staff productivity and, to a lesser extent, greater operational efficiency. They report a reduction in the effective interest rate from around 36% to 27% due to the ceiling imposed by regulation, while dependence on subsidies diminished among transformed MFIs.

Rhyne (2001) provides an interesting overview of the transformation landscape in Bolivia, describing how MFIs not used to having owners or regulatory supervisors suddenly find themselves under pressure from owners, along with a regulator demanding strict supervision. At the same time the author argues that the commercialization process, including NGO transformation, has shaped the industry and made Bolivia one of the most advanced microfinance markets.

Finally, the World Bank-commissioned guidebook by Ledgerwood and White (2006) presents reasons why NGO-MFIs ought to consider transforming and how the process should be managed. The book shows that transformation impacts most parts of the organization, including the management information system (MIS), manuals and processes, internal controls and customer service. It also

covers an interesting case study: the transformation of the Ugandan Microfinance Union into Uganda Microfinance Limited in 2005.[3]

2.4 Cross-country empirical evidence of the relation between financial and social performance

A number of studies investigate how regulatory and ownership status affect both poverty outreach and financial sustainability in a cross-country setting. Mersland and Strøm (2008), analyzing a sample of 132 NGO-MFIs and 68 shareholder firms, find that NGOs are neither more socially-oriented, nor are shareholder firms more commercially-oriented, compared with their counterparts. They conclude that it is up to policymakers to decide whether NGOs should be allowed to mobilize savings and become regulated without changing their ownership status. Hudon and Périlleux (2014) analyze the surplus distribution of MFIs and find that NGOs and shareholder-firm MFIs do not allocate their surplus in a significantly different way. Looking at the other dimension of transformation, Hartarska and Nadolnyak (2007) find that regulation neither affects social performance (measured by outreach), nor does it affect financial performance (measured by operational sustainability).

These studies empirically verify whether and how shareholder-owned (and typically regulated) MFIs are different from non-regulated NGOs, but do not take into account any information before and after transformation. It is thus difficult to attribute observed differences (or similarities) unambiguously to regulation or a change in ownership. Put differently, it is hard to isolate the effect of transformation from the effect of other unobserved intergroup differences. Moreover, several shareholder-owned MFIs involved in microfinance never actually transformed but started out in their existing organizational form.

A handful of studies single out the effect of transformation on both social and financial indicators by either employing information *before* and *after* transformation, or by constructing a control group of similar untransformed MFIs. The main emphasis of these studies is to verify whether transformation leads to mission drift, defined as a shift away from the poor (Woller et al., 1999).

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[3] Later, in 2008, Uganda Microfinance Limited was acquired by the Kenyan Equity Bank, further illustrating how organizational structures in microfinance continue to evolve.

Frank (2008) compares 25 transformed MFIs with a control group of 25 untransformed MFIs. The main finding is that transformed MFIs expand their client base and loan portfolio, which supports the argument that they transform in order to grow and serve more clients. Regarding social performance, the study finds a drop in the proportion of female clients and an increase in average loan sizes among transformed MFIs. Like Frank (2008), Chahine and Tannir (2010) compare the social and financial performance indicators of 68 transformed MFIs with a matched control sample of 68 non-transformed MFIs on a year-by-year basis. They find that the transformed institutions have more active borrowers than their non-transformed counterparts, but also higher average loan sizes. Wagenaar (2014) goes beyond this year-by-year comparison of transformed versus non-transformed MFIs by using a large international MFI panel dataset based on the MIX Market. As with the aforementioned studies, she finds an increase in average loan size and a decrease in the share of female customers. All of the above studies suggest that mission drift may be a result of transformation, which they conclude from an increase in average loan sizes and/or a drop in the share of female clients.

Compared to previous studies, our approach to the effect of transformation is novel: to our knowledge we are the first to apply event study methodology in this context. In addition, we investigate how transformation influences the MFI's overall business model, which includes the MFI's profit function, the mix of funding sources and the scope of services provided. Moreover, while the aforementioned studies focus on effects in the mean, we study whether effects differ along the distribution of variables.

3. Data and methodology

3.1 Data and summary statistics

The dataset was mainly gathered through a survey of Fernando (2004), Hishigsuren (2006), Frank (2008), a CGAP study by Lauer (2008) and a spreadsheet on legal status transition published by MIX Market (www.mixmarket.org). Next, data on transformed MFIs were gathered from the MIX database. Additional transformed MFIs were identified manually by screening academic papers, industry notes and documents.

Table 1 reports summary statistics on the 66 transformed MFIs in the database over the period 1993-2011 in Panel A and presents a regional distribution of several indicators in Panel B. The influence of extreme values is omitted by winsorizing the main variables at the top and bottom 1% of the distribution.[4] As displayed in Panel A, the median MFI in our sample manages a total loan portfolio of USD 7.2 million for around 16,600 borrowers and has been operating for nine years. The average loan size is USD 430. The median value for the inflation-adjusted portfolio yield is 23%, while the ROA and ROE are 3% and 13%, respectively. Panel B demonstrates that there is substantial heterogeneity among MFIs in different regions. For instance, while the average number of borrowers for South Asian MFIs is higher than 270,000, Eastern European and Russian MFIs have a mean borrower base of only around 8,000.

< Insert Table 1 here >

As illustrated in the previous sections, the current literature investigates differences between MFIs that have not transformed and those that have. Therefore, most studies on transformation identify *whether* MFIs have transformed, but not *when* the change actually occurred. This could be due to lack of longitudinal data or simply to the fact that the time of transformation is not observable. When this is the case, one can only employ between-MFI information and analyze how MFIs that have transformed at any given time are different from a non-transformed control group. As already mentioned, this poses a problem because the differences observed might not be the result of transformation at all, but of some other unobserved differences between transformed and non-transformed MFIs.

This issue is particularly problematic because the sub-sample of transformed MFIs is typically small in relation to the overall sample investigated. For instance, Hishigsuren (2006) reports 43 cases of transformed MFIs out of thousands of NGOs (status of 2006), while the sample used by Wagenaar (2014) contains 59 transformed MFIs (only 5% of the sample) covering the period up to 2010. This small share should not, however, be misinterpreted as an indication of the irrelevance of transformations. Figure 1 illustrates that the share of transformed MFIs in the global market, measured though various indicators, is not negligible. The share of borrowers catered for by transformed MFIs

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[4] To ensure robustness, we carried out the same set of analyses including extreme values, which did not alter the results.

has been rising steadily, up to almost a quarter of the entire market in 2010. Furthermore, transformed MFIs employ a significant share of the global microfinance workforce. The number of depositors and the share in gross loan portfolio also show a tendency to grow, albeit at a slower pace.

<Insert Figure 1 about here>

Figure 1 does not only show the significance of transformations, but also fuels concerns about the assumption that the observables of transformed and untransformed MFIs are similar *except for* transformation itself. Unobservable differences between the two groups may well influence the entrepreneurial decision whether to transform or not.

3.2 Method: exploiting within-MFI information

Given that we had enough data points for each transformed MFI, we exploited within-MFI information for a sample of transformed MFIs. By doing so, we singled out and quantified the changes in the MFI's business model induced by transformation. Furthermore, we employed an updated sample of 66 transformed MFIs over the period 1993-2011. Within this period, all MFIs under consideration underwent transformation during a known year t_0, changing from the status of an NGO to that of a bank or NBFI.

First, we reported the mean and median values for all variables under consideration *pre-* and *post-* transformation, and tested the significance of the differences observed. Second, we graphically reported the median values and interquartile ranges for variables under consideration in the interval $[t_0\text{-}7; t_0\text{+}7]$ to observe natural trends in the variables. Further, this enabled us to observe how those trends altered around point t_0 and whether different segments in the distribution of a variable were affected differently.

Next, we used insights from the event study methodology to isolate the effect of transformation for the variables under consideration. The aim was to estimate a *normal* value for each observation of the variables under consideration, using linear prediction based on an underlying regression analysis. In

this underlying regression we used the different cost and income drivers as the dependent variable; as explanatory variables we used broad MFI-level controls such as MFI size and age, as well as Gross National Income (GNI) per capita (in logs and PPP), to take the potential influence of fluctuations in the overall economy into account. Furthermore we included MFI fixed effects to control for any time-constant unobserved difference between the MFIs, including the legal and regulatory system, as well as year dummies, to reduce the impact of industry-wide trends and natural patterns over time. With each observation, fitted values that could be considered a *normal* value for a specific MFI in any given year and region were computed for the variable under consideration. The difference between the *actual* value and the fitted value then resulted in the *abnormal* value (or *excess* value) for a given MFI. If we denote by $Y_{i,t}$ the value for the dependent variable of interest for MFI *i* at year *t*, let $X_{i,t}$ be a vector of MFI characteristics and let $T_{i,t} \in \{0,1\}$ indicate whether the observed year lies before or after the transformation year t_{0i} for a given MFI (that is, $T_{i,t} = 1$ if $t_i > t_{0i}$), then our model elaborates as follows:

$$Y_{i,t}^{abnormal} = Y_{i,t} - E\left[Y_{i,t} \middle| T_{i,t} = 0\right], \text{ where}$$

$$E\left[Y_{i,t} \middle| T_{i,t} = 0\right] = \widehat{\alpha}_i + \widehat{\theta}_t + \hat{\beta}X_{i,t} + \hat{\gamma}GNI_{i,t} \quad \text{if } T_{i,t} = 0$$

$\widehat{\alpha}_i$ indicates the MFI fixed effects and $\widehat{\theta}_t$ the year dummies, while $\hat{\beta}$ and $\hat{\gamma}$ are the point estimates for the coefficients of MFI characteristics and per-capita GNI, respectively. The coefficients were derived using data points only prior to transformation for each MFI. For each such variable *Y* we reported the *actual* ($Y_{i,t}$), *fitted* ($E[Y_{i,t}|T_{i,t} = 0]$) and *abnormal* ($Y_{i,t}^{abnormal}$) values, averaged over each year relative to transformation within the interval $[t_0; t_0+7]$, thereby assessing the impact of transformation up to seven years after the event. Following the procedure outlined in Section 3 (Stages of the analysis), for each observation we calculated the predicted value based on the estimated coefficients of the regressions, which we labelled the *normal* value. Next, we calculated the *abnormal* value for each of the transformed observations as the difference between the *actual* value and *normal* value of the profit driver. Averaging the abnormal values (AV) over the *N* MFIs for a given *t* yields the overall annual abnormal values:

$$AV(t) = \frac{1}{N}\sum_i AV_i(t)$$

We also reported the *average* abnormal value (AAV) over the observed period after transformation (*T*=7) for each variable under study:

$$AAV = \frac{1}{T \cdot N} \sum_t \sum_i AV_i(t)$$

In order to check our results for sensitivity towards the choice of specification, we undertook several robustness checks assuming different underlying models. The results of the robustness checks are reported in Section 4.5.

4. Main results

4.1 Results of the underlying event study regressions

Table 2 depicts the estimates generated by our underlying regression model, presented above in Section 3. Since the regressions are based on observations prior to transformation of a given MFI, the number of years that enter the estimation varies for each MFI. On average, MFIs transformed nine years after their establishment. While 40% of the MFIs in the sample transformed between 2005 and 2007, the earliest transformation was recorded in 1992. Overall, the regressions cover a period of 18 years. The MFI characteristics that we considered were total assets (in logs) as a proxy for size, the MFI's age in years and the number of active borrowers (also in logs).[5] To circumvent endogeneity caused by the asset variable, we used one-period lags. Moreover we included GNI per capita (USD adjusted for purchasing power) to control for fluctuations in the overall economy which may affect an MFI's business model.

Panel A displays the regressions for the four main profit drivers. For each regression we reported the R-squared of the mean-deviated regression and labelled this the 'within R-squared'. Levels vary from .076 for the write-off ratio to .475 for operating expenses (Column 4), which indicates a reasonably good model fit.

Panel B contains the regression coefficients for the three profitability indicators: ROE, ROA and operational self-sustainability (OSS). The number of borrowers has a highly significant (1% level) and

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[5] Pearson's correlation coefficient between number of borrowers (in logs) and total assets (in logs) amounts to .67 before transformation, which we do not deem a major caveat as to our specification.

positive coefficient in all three specifications. All within R-squared values are satisfactorily high, with the ROA specification (.35) standing out.

<Insert table 2 here>

4.2 Transformation and the main profit drivers

The following three subsections present a combined analysis of the univariate mean and median comparisons, the median and quartile trend analysis derived from the graphs, and the results obtained through the event study methodology. To test changes in the means and median for significance, we applied 2-tailed t-tests and Pearson chi-square statistics, respectively.

<Insert Table 3 here>

<Insert Figure 2 here>

<Insert Table 4 here>

Comparing the median and mean values for portfolio yields shown in Table 3, we found that both nominal and real (inflation-adjusted) portfolio yields went down significantly after transformation. The median nominal portfolio yield fell from 37% to 30%, while the median real portfolio yield declined from 28% to 21%. The graphs in Figure 2 unveil a more nuanced pattern: in fact portfolio yield rose between seven and three years prior to transformation, before a steady decline set off in t_0-3 until t_0+7. This pattern can be observed across the entire distribution. The results of the event study depicted in Table 4 support the conclusion that actual transformation at time t_0 reinforces the falling trend in portfolio yield. This is true in both nominal and in inflation-adjusted terms. The average abnormal value of –3.9 per annum states that, considering all seven years after transformation, the observed nominal portfolio yield is on average 3.9 percentage points lower than in a predicted scenario without transformation. Similarly, real portfolio yield is on average 6.2 percentage points lower than predicted over the same period. Taken together, the results suggest that transformation induces a drop in interest rates charged to microborrowers.

Turning to the operating expenses ratio, Table 3 shows a significant decrease in operating costs in both median (from 24.4% to 16.9%) and mean value (from 31.1% to 21.8%), the differences being significant at the 1% level. The graph in Figure 2 confirms the steady decrease. Some interesting pattern in the distribution of operating costs emerges from the graphical analysis: after transformation, both the median and the upper quartile approach the lower quartile, which mostly remains at the same level. Thus seven years after transformation, most MFIs were able to cut back their operating costs ratio to similar and low levels, ranging from 11% to 16%. Results of the event study, depicted in Table 4, show that operating costs were consistently lower after MFIs had transformed, compared to an estimated counterfactual situation without transformation. Compared to the drop in yield, the transformation-induced reduction in operational costs was lower (1.1 percentage points) though still at economically very significant levels. Moreover, the consistency in direction and the relatively high within R-squared in the underlying regression (.48) strengthen the validity of the results.

Turning to funding costs, we observe a significant increase in the median in Table 3, while at the same time the mean funding costs fall slightly. This hints at differential trends concerning funding costs along the distribution. Indeed, looking at the graph in Figure 2, one can observe different behaviors of the upper and lower quartiles of funding costs. The upper quartile exhibits an increasing trend before transformation, which is reversed after transformation. The lower quartile, in contrast, mainly fluctuates around a steady level, with the exception of the first three post-transformation years, where it experiences a temporary increase from 5% to 7%. The event study results presented in Table 4 complement the univariate analysis, showing that in the interval $[t_0; t_0+7]$, funding costs are on average 4.4 percentage points lower than the predicted values. This is mainly because the predicted values had forecasted a strong trend towards increased funding costs after transformation, while actual funding costs remained rather at the same level post-transformation.

We also note that the dispersion of funding costs within MFIs, as measured by the standard deviation across years, decreased significantly (at the 5% level) during the observed post-transformation period (figures not shown). In combination with the observed insignificant change in the *mean* funding cost (see Table 3), this implies a mean-preserving contraction of the distribution of funding costs after transformation. Since a mean-preserving spread in the distribution of a random variable is commonly

defined as an increase in risk (Stiglitz and Weiss, 1981), we understand the observed mean-preserving contraction in the distribution of funding costs to be a decrease in the profit risk.

Another component in the profit function are loan losses, measured by (i.) portfolio at risk after 30 days and (ii.) the loan write-off ratio. Table 3 shows a significant rise in the mean of portfolio at risk (10% level), while the increase in the median is insignificant. Conversely, no significant change in the mean write-off ratio can be found, whereas the median falls significantly (10% level). No clear tendencies emerge from the graphs in Figure 2, and the upper quartiles especially are very volatile in both cases. Regarding the results of the event study in Table 4, we do not observe a meaningful effect of transformation on loan losses, either. We therefore concluded that in the medium run, transformation did not have any observable effect on the loan losses of MFIs.

Summarizing the results concerning profit drivers, we found a significant reduction in real and nominal portfolio yield, which corresponds to a lowering in interest rates charged to customers. This went along with decreased operational costs, especially for MFIs with previously high levels of operational costs. The univariate trend in the cost of funds was somewhat ambiguous, but we did observe a significant decline in the spread of funding costs after transformation, which translates into a decrease in risk linked to funding costs. Finally, loan losses did not seem to be affected by the process of transformation.

4.3 Transformation and overall profitability

The three main profit indicators considered in this study are return on equity (ROE), return on assets (ROA) and operational self-sustainability (OSS), which measures the share of operational costs that are covered by an MFIs' own income.

Starting with ROA, we did not detect a significant change in the mean as captured by Table 3, while the median ROA fell significantly from 4.6 to 2.7. The analysis in Figure 2 indicates that the median and upper quartile ROA are decreasing in the long term, though not smoothly. Interestingly, the lower quartile stands in contrast to this trend, as it sees its ROA mostly constant or rising, but hardly decreasing during the observed period. As with funding costs, described above, the fluctuation in ROA *after* transformation is lower than *before* transformation. Event study results, shown in Table 4, reveal

the constantly negative effects of transformation on ROA (averaging -3.7 percentage points in the period t_0 to t_0+7).

Regarding ROE, which is a more interesting measure from an investor's point of view, Table 3 does not display any significant changes, neither in the mean nor in the median. Figure 2 reveals that ROE experienced a drop one year after transformation, but then followed a relatively stable growth path from $t=2$ onwards. Turning to the event study results in Table 4, we can see that the abnormal values were consistently negative in the interval $[t_0; t_0+4]$, hinting at an initial loss in ROE due to transformation. Subsequently however, from t_0+5 to t_0+7, ROE rocketed, offering returns that were higher compared to a scenario without transformation – in the range of 16 to 32 percentage points.

Turning to OSS, we do not observe any significant change in the median or mean value after transformation, as shown in Table 3. The graphical analysis in Figure 2 shows that the median OSS did not exhibit an overall trend over the entire period. The drop in OSS observed in the year after transformation was offset by an increase three years later. The overall trend in the lower quartile, i.e. in the less profitable MFIs, was upward-sloping. After transformation, most MFIs (at least 75%) were able to cover their operational costs through their own operational revenue every year, whereas seven years prior to transformation, this was the case for only 50% of the sample MFIs. The abnormal values in Table 4 suggest that in the first four years after transformation, OSS was substantially lower compared to the predicted values. The difference was less stark in the interval $[t_0+5; t_0+7]$, but altogether our results indicate a significant decrease in the MFI's OSS.

Taken together, two out of three indicators suggest a negative impact on the average profitability in the short to medium run. Previously low-performing MFIs were able to increase their self-sufficiency compared to pre-transformation levels. However, investors and shareholders are mainly interested in the third indicator, ROE; here we found a strong increase induced by transformation in the medium run, approximately five years after transformation.

4.4 Debt funding, deposits and mission drift indicators

Table 5 presents mean and median values before and after transformation for indicators concerning debt-financing, subsidized borrowing and donations, portfolio growth, deposits and average loan size. Figure 3 plots the median values for the same indicators, again seven years before and after transformation. Table 5 indicates that debt leverage sharply increased after transformation, as shown by the significant increase in the debt-to-equity ratio in mean and median. At the same time, donations and subsidized funds fell significantly. After transformation, at least half of the MFIs neither relied on subsidized funds nor on donations of any kind. This is also illustrated by Figure 3, where the opposing trends of commercial debt, on the one hand, and subsidized debt plus donations, on the other hand, can be observed. Interestingly we see a one-off dip in the mean debt-to-equity ratio in the year of transformation, which was probably driven by new equity injections by investors as well as minimum equity requirements imposed by the banking regulator in order for the MFI to get a license to operate. In subsequent years, however, growth in debt was clearly higher than growth in equity, which is the same natural pattern usually observed for banks owned by shareholders.

Table 5 further demonstrates that the number of depositors increased substantially after transformation, on average from 8,241 to 53,117. It also shows that growth in both portfolio and assets slowed down significantly after transformation. Figure 3 confirms the long-term increase in the number of depositors after transformation, as well as the generally declining trend in asset and portfolio growth. Yet growth remained high, and never fell below 25% on average.

In line with previous empirical findings discussed in Section 2.4, we also found that the average loan size increased significantly after transformation, from USD 566 to USD 1,368 on average, as can be seen in Table 5. This finding is not altered if average loan size is scaled by GNI per capita. In Figure 3 we can see that even though loan sizes tended to grow modestly before transformation, they soared in the year when MFIs transformed, and in the year after that.

<Insert table 5 here>

<Insert figure 3 here>

4.5 Robustness checks

As a robustness check of the event study methodology, we computed average abnormal values for different underlying regression models, in order to ensure that the results were not driven by the specification or a particular set of independent variables. Table 7 shows the average abnormal values calculated over our interval of interest $[t_0; t_0+7]$ for different control regressions. Model 1 is a pooled OLS which ignores MFI and time effects, whereas in the second model, those dummies are considered exclusively. Model 3 replaces the MFI dummies with country dummies, essentially pooling all MFIs within a country. Models 4 and 5 use alternative MFI characteristics as independent variables, specifically the regulatory framework (Model 4) and the amount of deposits taken (Model 5). The regulatory framework is measured by a dummy indicating whether or not a MFI is regulated.[6] Controlling for deposits as in Model 5 is generally desirable, since they constitute an alternative source for debt financing. However, deposits cause endogeneity problems, since they reflect the *choice* of the MFI to collect deposits, which is why we did not include them in the preferred model. Model 6 runs a specification similar to the preferred one, but cross-sectionally for each year, such that it produces different coefficients for each year. For direct comparison purposes, Column 7 shows the average abnormal values obtained through our preferred specification (as shown in Table 4).

With the exception of ROE, none of the previous findings was challenged by the additional specifications. ROE, in contrast, displayed negative average abnormal values in every model, except for Model 6. Thus, the initial negative impact on equity profitability after transformation, as previously estimated (Table 4), could even outweigh the steep rise experienced thereafter, at least taken together over the first seven years after transformation. Our findings concerning ROE should thus be interpreted with care. Other findings, notably the decrease in interest rates and in operational costs, and the relatively lower ROA and OSS due to transformation, were confirmed by the abnormal values computed through the control regressions.

Furthermore, as a falsification exercise, we compared the annual abnormal values obtained for the interval $[t_0; t_0+7]$ in our preferred estimation model with the annual abnormal values *before*

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[6] It should be noted that only five out of the 66 sample MFIs were not regulated.

transformation, that is in the interval $[t_0\text{-}7; t_0\text{-}1]$.[7] For almost all variables we noticed unsystematic fluctuations in the annual abnormal values before transformation; generally these values were of less magnitude than after transformation. This further confirms that the effects we found can be attributed to the transformation event.

A notable exception in this exercise was ROA, where we found a decreasing trend in abnormal values that seemed to begin three years before the legal transformation was actually finalized. We conjecture that a decline in profitability already occurred during the planning and preparation stages of transformation, which is understandable in light of our description of transformation as a profound and time-consuming process. Specifically, this might have been caused by a *combination* of many different adjustments at different levels of the institution (such as: loan officer, client, management or investor); these may have added up to a significant overall drop in profitability as early as in the preparation phase of transformation.

4.6 Discussion of the results

We believe that the reduction in portfolio yield is perfectly consistent with the process of transformation described above, and this for several reasons. First, when an MFI becomes regulated, it can no longer 'play around' with mandatory savings, fees, insurance and commissions, which drive up the cost of borrowing for clients. Increased transparency, and in some cases also caps on interest rates imposed by regulators, lead to a decrease in portfolio yield. Second, expanding MFIs will naturally enter new market segments, where they often will experience tougher competition that will push them to reduce prices. Likewise, larger loan sizes will reduce MFIs' costs and enable them to lower their prices to clients (Rosenberg et al., 2013). In any case, clients eventually benefit from lower interest rates, which is considered one of the major challenges in the industry (Hudon and Sandberg, 2013); for now we cannot discern whether new or existing clients have benefited most from the decline in interest rates.

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[7] We are thankful to an anonymous referee for raising this point. Tables are not shown here.

From a financial perspective the main benefit of transformation seems to be the reduction in operational costs. Mersland and Strøm (2014) report that these costs account for more than 60% of an MFI's revenue and are the main challenge in making the microfinance business model sustainable. In our sample, operating costs ate up almost 80% of the revenue before transformation, while for funding costs this figure amounted to 14%. The net effect of transformation on overall financial viability can thus be expected to be positive.

The reduction in operational costs is also compatible with the process of transformation outlined above. Standardization and economies of scale bring economic benefits to MFIs. For instance, regulators frequently request the use of a new, or at least better developed Management Information System (MIS), allowing for submitting more accurate and more frequent data but also helping MFIs to become more efficient. This is an interesting point because it is well-known that being regulated is costly for MFIs (Hartarska and Nadolnyak, 2007; Cull et al, 2011). Growth and professionalization also allow for economies of scale, which further brings down operational costs, as illustrated by Hartarska et al. (2013).

Funding costs exhibited differential trends along the distribution. The increase in median financial costs for MFIs can be explained by restricted access to subsidized debt, prompting them to turn to regular commercial debt markets (Mersland and Urgeghe, 2013). Transformed MFIs that tap into commercial lenders on bond markets, for example, experience a rise in their funding cost ratios. The reason why we did not observe an increase in upper parts of the distribution is probably that MFIs with high funding costs prior to transformation had already tapped into those markets before. Those MFIs actually experienced a decline in their funding costs, as they could now take advantage of a larger pool of potential debt-financing sources, which allowed for arbitrage. Overall, transformed MFIs, now owned by shareholders, may also lose access to various types of subsidies, including grants (D'Espallier et al., 2013; Mersland, 2009). In any case, the change in funding costs was outweighed by the decrease in operational costs, as mentioned above.

Reduced variability in funding cost after transformation corresponds to a decrease in the risk that surrounds expected profits. Once an MFI has transformed into a shareholder firm, private equity is at stake and its shareholders are held liable for potential losses. Keeping costs at a stable level is thus a

prudential response to intrinsic revenue risk in the microfinance industry, in particular when uncertainties arise due to the expansion of services and operations on a larger scale. In addition, the regulatory framework often stipulates improved risk management mechanisms for MFIs.

Returns on assets and operational self-sufficiency were found to fall after transformation. These results should not, however, be interpreted as meaning that transformation leads to lower profits for the MFI's shareholders. Investors are interested in the return on their own capital, that is equity. When MFIs grow, they leverage an increasing share of their assets with debt, which will in most cases naturally lead to a drop in ROA, and corresponds to the steep rise that we found in the debt-to-equity ratio. Likewise, ROE can be higher at lower levels of OSS. We observed that ROE followed the pattern of a natural business case: after an initial drop, the investment (in this case, the transformation) started paying off through higher returns, even though the initial period in which losses were incurred could amount to several years. Our findings might hint that transformed MFIs have a more profit-oriented focus, potentially driven by shareholders demanding a return on their investments, or by regulators demanding more financially sound banks and NBFIs. Moreover, the fact that MFIs not performing strongly prior to transformation were able to improve their performance upon transformation is interesting, and once more indicates that regulation and a change in ownership were followed by a reduction in profit risk.

The gradually increasing amount of debt taken on by MFIs is also interesting: it mirrors the leverage ratios of traditional banks. Yet, MFIs' leverage ratios remain much lower than those of traditional banks. For instance, Kalemli-Ozcan et al. (2012) analyzed 180,460 banks and found a mean equity of USD 0.8 billion and a mean debt of USD 10.7 billion, which makes a debt-to-equity ratio of 13.37. The same ratio was 7.05 for MFIs in our sample, seven years after transformation. It will be important for future research to ascertain whether stable growth in MFIs' debt leverage will continue and whether it will settle at lower levels than those of traditional banks.

Regarding the range of services offered, we observe that transformation has enabled many MFIs to offer savings products to their clients, in line with the theory of mission expansion (Mersland, 2011). At the same time, increased mobilization of savings represents part of the higher debt leverage.

In line with previous studies (Chahine and Tannir 2010; Wagenaar 2014; Khalily et al., 2014) we found a significant increase in average loan size, both in absolute terms and scaled by GNI per capita. Commonly, this is attributed to a drift away from the MFI's stated mission to primarily serve the poor. While this may well be the case, it could also be that MFIs expand their mission (Mersland, 2011) and start serving wealthier segments alongside original segments. Likewise, the increased average loan size could stem from the fact that transformed MFIs were more able to attract funding and thereby give out larger loans to existing clients with a reliable repayment capacity. In any case, more research is warranted on the influence that transformation can exercise on the MFI's mission, and on indicators that measure mission drift more persuasively, i.e. going beyond changes in average loan size.

Naturally, our results hinge upon the validity of the underlying regression model. Like any other non-experimental study, they run the risk of suffering from omitting variable bias. But the fact that our study controlled for time-constant individual MFI characteristics, as well as for the year of observation and for economic cycle effects, mitigated that risk. The robustness checks presented in Section 4.5 indicate that the results are unaffected by various alterations in the underlying models.

Furthermore, the underlying regression rests on the assumption of linearity in coefficients. This comes at the cost of missing out on potential non-linear effects. Another possibility would be to apply non- or semi-parametric methods, that do not (or to a lesser extent) rely on distributional assumptions regarding random variables. On the other hand, those approaches have other disadvantages, such as restrictions in calculating out-of-sample predictions, which is a crucial ingredient of event study methodology. Besides, the approach chosen in this study is a mix of parametric methods (the event study and t-tests) and nonparametric methods (the quartile trend analysis and median tests).

While the exploitation of within-MFI data to detect the effects of transformation has the advantage of controlling for time-constant unobservables between the MFIs, its shortcoming is that the MFIs under study are selected according to the explanatory variable, that is transformation. Put differently, we did not have a control group with which we could compare results. Therefore, the question we aimed to answer in this study was: "What happens to an MFI's business model, *if* the MFI transforms?".

Matching transformed MFIs with a control sample based on similarities in observables could potentially cope with those shortcomings. However, in our context this entails various problems. For

instance, matching in a dynamic panel setting rests on many assumptions that are not easily met (such as a common trend), or it has to be performed in a cross-sectional setting, which bears the difficulty of aggregating over the panel. Second, matched control sample approaches are suitable to match non-*treated* units. Yet, given the profound organizational changes and involvement of various stakeholders described in this study, it is difficult to argue that a transformation should be interpreted as a(n) (exogenous) treatment; it could even be that the decision itself is what distinguishes transformed from untransformed NGO-MFIs. Thus we believe that our approach, exploiting *within*-MFI data, is more suitable for capturing the effects of transformation.

5. Conclusions

In this paper we studied how the business model of MFIs changed when they transformed from NGOs into shareholder-owned financial entities. We thereby complement the empirical literature on institutional transformation in three ways. First, we have drawn a broader picture of transformation by focusing on the entire MFI business model, rather than keeping a narrow focus on social performance in terms of average loans and percentage of female clients. By focusing on the components of the MFI's profit function as well as on growth rates, the funding structure, and the expansion in services, we obtained a more complete picture of all the organizational changes induced by transformation. Further, we were better able to gauge the effect of transformation on financial sustainability.

Second, the information we used is *within-MFI* rather than *between-MFI*, which means that we could study the transformation process and the resulting changes in business models in greater detail. We believe that this is an important addition to the literature, which has mostly observed differences between transformed and untransformed counterparts, thus implicitly assuming that groups are perfectly comparable. To this end we applied the event study methodology to 66 transformed MFIs, and compared actual and predicted values in order to derive the excess value due to transformation for all cost and income components under study.

Third, we did not limit the analysis to effects in the mean, but also investigated changes along the distribution of the variables. Specifically, we studied the trend in median values as well as in the lower and upper quartiles and found differential effects for some variables.

We noted that annual interest rates charged by MFIs fell by 5.9 percentage points on average (from 39.5% to 33.6%) after transformation. While interest rates had started to decrease prior to transformation, we found that 3.9 percentage points in the reduction could be attributed to transformation itself.

Another main benefit of transformation concerns operational costs. Comparing the seven years after transformation with the seven years before, operational costs were pushed down by 9 percentage points on average. We estimate that 1.1 percentage points thereof were due to transformation. This could however underestimate the overall benefit of transformation in cutting back operational costs, since it does not count efficiency gains already achieved through adjustments during the preparatory phase prior to transformation.

Turning to funding and clients, we noted a significant increase in the debt-to-equity ratio and funding expenses, a decline in donated funds and a sharp upturn in deposits. To finance the continued growth of their portfolios, transformed MFIs increasingly mobilized savings and tended to take on more debt. The volatility of their funding costs decreased significantly as the distribution of the funding costs contracted. Overall, reduced volatility in the cost of funds can be understood as another benefit stemming from transformation.

Looking at overall financial profitability, we found that transformation had an average negative effect on ROA and OSS, due to increased leverage levels. Moreover, MFIs that were initially at the lower end of the distribution particularly benefited from increased operational self-sufficiency. We also found that the abnormal values for ROE turned positive some years after transformation had taken place, suggesting that transformation had driven up returns substantially in the medium to long run, providing strong incentives for equity investments in transformed MFIs. In the light of expressed concerns about the adverse effects of behavior that has become increasingly profit-seeking in the microfinance sector (Bateman, 2010), investigating how this may influence MFIs' missions is an important future research avenue.

While our approach – exploiting within-MFI rather than between-MFI variation – has advantages in disentangling the effects of transformation, further comparisons between untransformed and transformed MFIs should not be dismissed. Notwithstanding the caveats about the application of a matched control sample approach that we mentioned earlier, there is some scope for further research to elaborate on those methods, particularly if MFIs continue transforming and thus a larger sample covering a longer period becomes available.

Further research is also warranted to analyze more precisely the social impact of transformation on the clientele of transformed MFIs and to interpret the significance of increased average loan sizes. A higher average loan size could be a sign of mission drift if MFIs stopped serving their historical clientele and gravitated towards wealthier clients. However, it could also signal mission fulfillment if larger loans were granted to the existing clientele, or if the client base was expanded rather than substituted.

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Tables and figures

Figure 1. The growing significance of transformed MFIs in the global microfinance market (1999-2010)

Share of MFIs in the global market in percent per year for various indicators. Data obtained from MIX market dataset and through own compilation
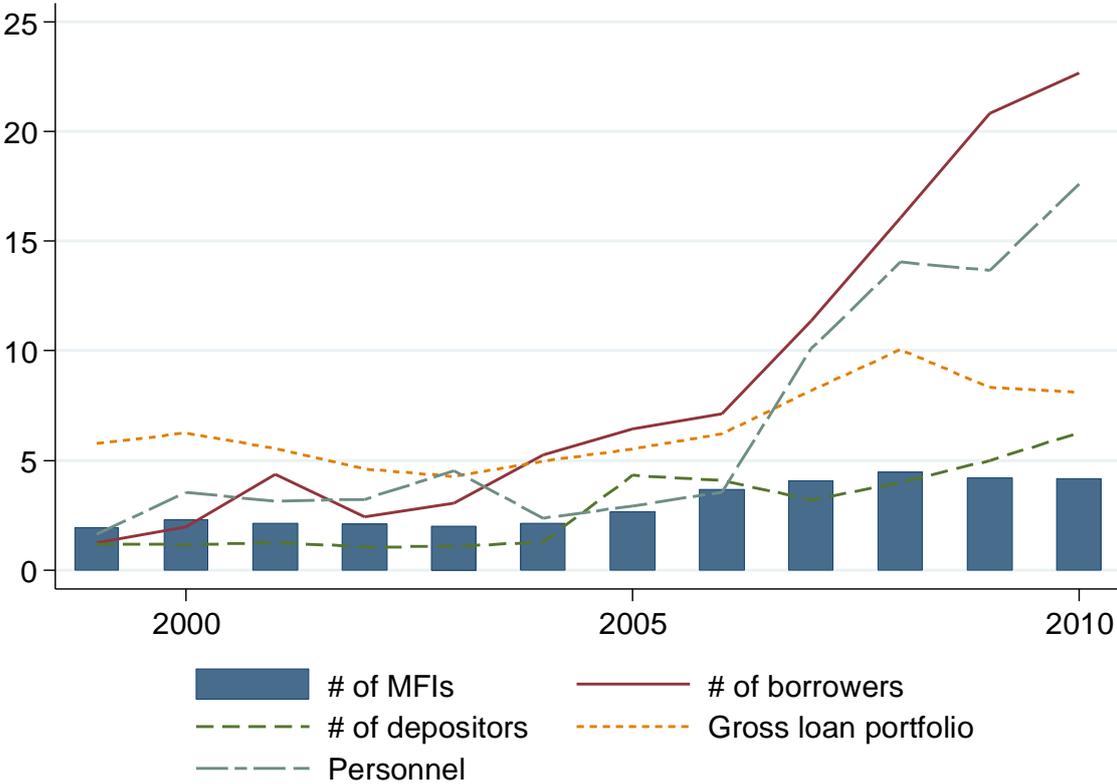
Table 1. Summary stats

Panel A. Summary statistics for the sample of 66 MFIs observed over the period 1993-2011. To remove the influence of outliers, the following variables were winsorized at the top and bottom 1%: portfolio yield nominal, portfolio yield real, operating expense ratio, ROA, ROE, OSS, debt-to-equity ratio, portfolio growth, total assets growth, borrowers and donations ratio.

Variables	Definition	n	mean	median	min	max
general variables						
TA	*total assets in US$'000*	713	51,800	9,736	30.074	1,160,000
Borrowers	*number of active borrowers*	706	100,723	16,626	173	2,811,553
GLP	*gross loan portfolio in US$'000*	716	41,800	7,254	4.704	961,000
Age	*number of years since established*	723	9.98	9	1	29
Average loan	*average loan balance per borrower in US$*	707	1,031	430	8.00	41,809
Average loan to GNI per capita	*average loan balance relative to PPP-adjusted GNI per capita*	691	0.24	0.16	0.01	3.30
Deposits	*deposit amount in US$'000*	681	13,900	0	0	911,000
Depositors	*number of depositors*	664	34,599	0	0	3,254,913
Portfolio growth	*pct growth in gross loan portfolio*	648	63.61	41.29	-86.94	500.00
Total assets growth	*pct growth in total assets*	645	56.66	38.41	-43	402
Debt-to-equity ratio	*ratio of external debt to equity*	708	4.358	2.425	0.00	30.00

GNI per capita	gross national income per capita, PPP-adjusted, in US$	703	3,900	2,720	610	19,850
Donations ratio	donations as pct. of average liabilities	641	172	0.45	0	10319
Subsidized debt ratio	subsidized funds (difference between financial expenses and market rate cost of funds) as pct. of average liabilities	440	0.54	0	0	7.09

profit drivers and overall profits

Portfolio yield (nominal)	financial revenues as pct. of GLP	627	35.67	31.67	11.00	90.00
Portfolio yield (real)	nominal portfolio yield corrected for inflation	606	27.24	23.85	1.59	84.00
Cost of funds	financial expenses as pct. of average liabilities	637	8.89	8.01	0.00	97.85
Operating expense ratio	operational costs as pct. of annual average outstanding loan balance	645	25.17	19.71	5.00	95.00
Par 30	portfolio at risk 30 days in arrears	676	3.24	1.67	0.00	52.10
Write-off rate	written off portfolio as pct. of GLP	594	1.42	0.59	0.00	56.59
Return on assets (ROA)	net operating income as pct. of total assets	644	2.81	3.07	-51.00	25.00
Return on equity (ROE)	net operating income as pct. of equity	643	13.63	13.37	-87.00	95.00
Operational self-sustainability (OSS)	operating revenue as pct. of the sum of financial expense, loan-loss provision expense and operating expense	703	117.37	117.63	0.00	200.00

Panel B. Regional distribution of key indicators, averaged over MFIs and years

Region	# of MFIs	# of borrowers	Total assets growth (in pct.)	Avg. loan size (in US$)	Age at transformation	Share of MFIs offering savings	Share of regulated MFIs
Sub-Saharan Africa	3	33,032	24.6	307	15.7	100%	100%
East Asia and the Pacific	8	62,689	48.6	432	9.4	100%	100%
Eastern Europe and Russia	10	8,414	41.5	4233	9.1	10%	90%
Central Asia	16	12,298	63.4	722	6.3	38%	100%
Latin America and The Caribbean	14	62,107	30.2	929	12.9	79%	86%
Middle East and North Africa	1	8,516	48.5	823	5.0	0%	100%
South Asia	14	274,343	106.9	123	7.3	86%	86%

Table 2. Underlying regressions to derive fitted values for cost and income components, and overall profits

Panel A. Regressions of the 4 main profit drivers. *t*-stats given in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Portfolio yield nominal	Portfolio yield real	Cost of funds ratio	Operating expense ratio	Par 30	Write-off ratio
Independent variables						
Total assets lagged (log)	-1.166	-1.443	3.944	-4.669**	0.391	-0.163
	(-0.64)	(-0.76)	(1.53)	(-2.14)	(0.91)	(-0.49)
Age	-3.391***	-3.150***	1.271	-1.464*	2.435***	1.366***
	(-4.19)	(-3.83)	(0.93)	(-1.72)	(12.16)	(6.75)
# of borrowers (log)	2.688	2.235	-5.928	-4.078	0.00619	-0.0684
	(1.58)	(1.07)	(-1.29)	(-1.18)	(0.02)	(-0.16)
GNI p.c. PPP (log)	-19.98	13.42	-26.88	-24.93	-12.79	5.691
	(-0.83)	(0.37)	(-1.42)	(-1.32)	(-1.60)	(1.33)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Model statistics						
Within R-squared	0.192	0.143	0.109	0.475	0.095	0.076
Observations	268	268	275	281	276	254

Panel B. Underlying regressions to derive the fitted values as the linear prediction for overall profits.

	(7)	(8)	(9)
	ROE	ROA	OSS
Independent variables			
Total assets lagged (log)	-0.821	1.676	5.959
	(-0.14)	(0.98)	(1.45)
Age	-28.31***	-1.455*	-8.515***
	(-7.85)	(-1.96)	(-3.61)
# of borrowers (log)	11.23***	5.199**	10.70**
	(2.72)	(2.19)	(2.46)
GNI p.c. PPP (log)	48.67	7.717	31.02
	(1.39)	(0.58)	(0.71)
Year dummies	Yes	Yes	Yes
Model statistics			
Within R-squared	0.231	0.354	0.277
Observations	279	280	285

Table 3. Profit drivers and overall profitability before and after transformation

Mean and median values for different profit drivers before and after transformation. Significance of differences tested using 2-tailed t-tests for mean values and Pearson χ²-statistics for median values. *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.

	mean values			median values		
	before t	*after t*	*sig.(t-test)*	*before t*	*after t*	*sig. (Pearson χ²)*
Income/interest rates						
Portfolio yield (nominal)	39.53	33.57	-4.42***	37.06	30.27	15.01***
Portfolio yield (real)	30.94	25.12	-4.32***	28.05	21.87	19.25***
Operational costs						
Operating expense ratio	31.09	21.75	-6.62***	24.43	16.86	42.09***
Financial costs						
Cost of funds	9.41	8.62	-1.14	6.54	8.50	19.16***
Losses						
Par 30	2.62	3.65	1.52*	1.40	1.95	2.70
Write-off ratio	1.37	1.45	0.31	0.73	0.54	3.49*
Overall profitability						
ROA	2.62	2.92	0.40	4.55	2.72	6.32**
ROE	14.77	12.98	-0.77	11.81	13.19	0.29
OSS	115.40	118.73	1.27	118.34	116.79	0.10

Figure 2. Trends in profit drivers and overall profitability before and after transformation

Median values and interquartile ranges for profit drivers and profits in an interval $[t_0\text{-}7;\ t_0\text{+}7]$ around transformation. No values are reported for any variable at time t if less than 10 observations at t.
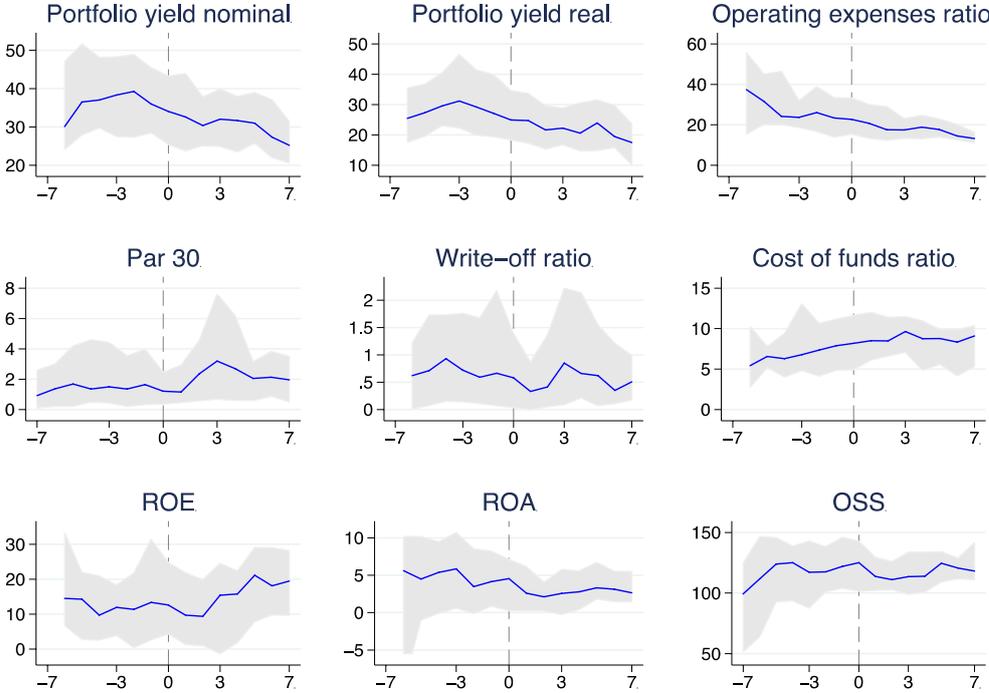
Table 4. Actual, fitted and abnormal values for the main profit drivers and profits after transformation

Panel A. Profit drivers after transformation time t_0, average per MFI

Profit driver	Values	t_0	t_0+1	t_0+2	t_0+3	t_0+4	t_0+5	t_0+6	t_0+7	*mean*
Income/Interest rates										
Portfolio yield nominal	Actual	37.73	35.46	33.41	34.18	33.22	33.96	31.45	30.04	–
	Fitted	36.75	36.58	37.11	37.94	38.13	39.73	38.23	36.08	–
	abnormal	*0.98*	*-1.12*	*-3.7*	*-3.76*	*-4.91*	*-5.77*	*-6.78*	*-6.04*	***-3.89***
Portfolio yield real	Actual	29.93	27.67	24.61	24.54	24.19	24.71	23.49	19.71	–
	Fitted	28.76	28.43	29.19	29.68	30.14	33.27	35.37	33.18	–
	abnormal	*1.17*	*-0.76*	*-4.58*	*-5.14*	*-5.95*	*-8.56*	*-11.88*	*-13.47*	***-6.15***
Operating costs										
Operating expense ratio	Actual	27.62	24.74	22.37	21.36	22.32	20.22	17.94	15.35	–
	Fitted	26.59	25.63	25.04	24.27	23.43	21.83	18.13	15.85	–
	abnormal	*1.03*	*-0.89*	*-2.67*	*-2.91*	*-1.11*	*-1.61*	*-0.19*	*-0.5*	***-1.11***
Funding costs										
Cost of funds ratio	Actual	8.26	9.31	9.04	9.72	8.14	8.3	8.02	8.2	–
	Fitted	9.09	10.67	11.26	12.67	13.44	15.44	15.49	15.69	–
	abnormal	*-0.83*	*-1.36*	*-2.22*	*-2.95*	*-5.3*	*-7.14*	*-7.47*	*-7.49*	***-4.35***
Loan losses										
Par 30	Actual	2.31	2.91	3.5	5.1	5.1	2.66	4.31	2.89	–
	Fitted	2.43	2.84	2.75	2.96	3.22	4.3	4.63	5.65	–
	abnormal	*-0.12*	*0.07*	*0.75*	*2.14*	*1.88*	*-1.64*	*-0.32*	*-2.76*	***0.00***

Write-off ratio	Actual	1.27	1.11	2.03	1.79	1.62	1.28	0.73	0.92	–
	Fitted	1.38	1.47	1.4	1.32	1.36	2.21	3.08	3.55	–
	abnormal	*-0.11*	*-0.36*	*0.63*	*0.47*	*0.26*	*-0.93*	*-2.35*	*-2.63*	***-0.63***

Write-off ratio	Actual	1.27	1.11	2.03	1.79	1.62	1.28	0.73	0.92	–
	Fitted	1.38	1.47	1.4	1.32	1.36	2.21	3.08	3.55	–
	abnormal	*-0.11*	*-0.36*	*0.63*	*0.47*	*0.26*	*-0.93*	*-2.35*	*-2.63*	***-0.63***

Panel B. Overall profits after transformation time t_0, average per MFI

|	Values	t_0	t_0+1	t_0+2	t_0+3	t_0+4	t_0+5	t_0+6	t_0+7	mean
Overall profitability										
ROE	Actual	16.05	8.84	7.9	11.34	9.35	19.78	18.91	15.39	–
	Fitted	17.13	13.01	14.69	15.5	16.88	3.58	-0.74	-16.96	–
	abnormal	*-1.08*	*-4.17*	*-6.79*	*-4.16*	*-7.53*	*16.2*	*19.65*	*32.35*	***5.56***
ROA	Actual	3.13	2.55	2.25	2.35	2.46	4.25	3.8	3.24	–
	Fitted	4.18	4.34	4.94	5.88	6.68	7.65	8.78	8.76	–
	abnormal	*-1.05*	*-1.79*	*-2.69*	*-3.53*	*-4.22*	*-3.4*	*-4.98*	*-5.52*	***-3.40***
OSS	Actual	124.2	116.75	114.33	114.85	115.27	123.89	124.39	123.54	–
	Fitted	127.46	128.31	129.95	132.02	132.88	128.48	130.82	124.79	–
	abnormal	*-3.26*	*-11.56*	*-15.62*	*-17.17*	*-17.61*	*-4.59*	*-6.43*	*-1.25*	***-9.69***

Table 5. Deposits, external debt, growth and average loans before and after transformation

Mean and median values before and after transformation for variables related to the loan size, use of deposits, use of external debt and growth. Significance of differences tested using t-tests for mean values and Pearson χ^2-statistics for median values. *, ** and *** is significance at 10%, 5% and 1%, respectively.

	mean values			median values		
	before t_0	after t_0	sig. (t-test)	before t_0	after t_0	sig. (Pearson χ^2)
Funding sources						
debt-to-equity ratio	3.54	4.93	3.03***	0.97	3.61	122.29***
subsidized debt ratio	1.07	0.39	-4.53***	0.00	0.00	10.13***
donations ratio	363.80	31.12	-3.64***	4.48	0.00	108.64***
Deposits						
depositors	8,241	53,117	3.69***	0.00	97.5	35.01***
deposits	135,990	22,753,471	4.33***	0.00	0.00	90.06***
Growth						
portfolio growth	90.87	48.09	-6.31***	55.57	35.47	14.12***
total assets growth	76.56	45.48	-5.37***	48.67	33.13	15.09***
Average loan size						
Avg. loan	566	1368	4.51***	257	652	53.04***
Avg. loan / GNI p.c.	0.17	0.29	5.76***	0.11	0.20	38.47***

Figure 3. Loan size, use of deposits, use of external debt, and growth before and after transformation

Panel A. Mean values for debt-to-equity ratio, subsidized debt and donations in an interval $[t_0-7; t_0+7]$ around transformation.
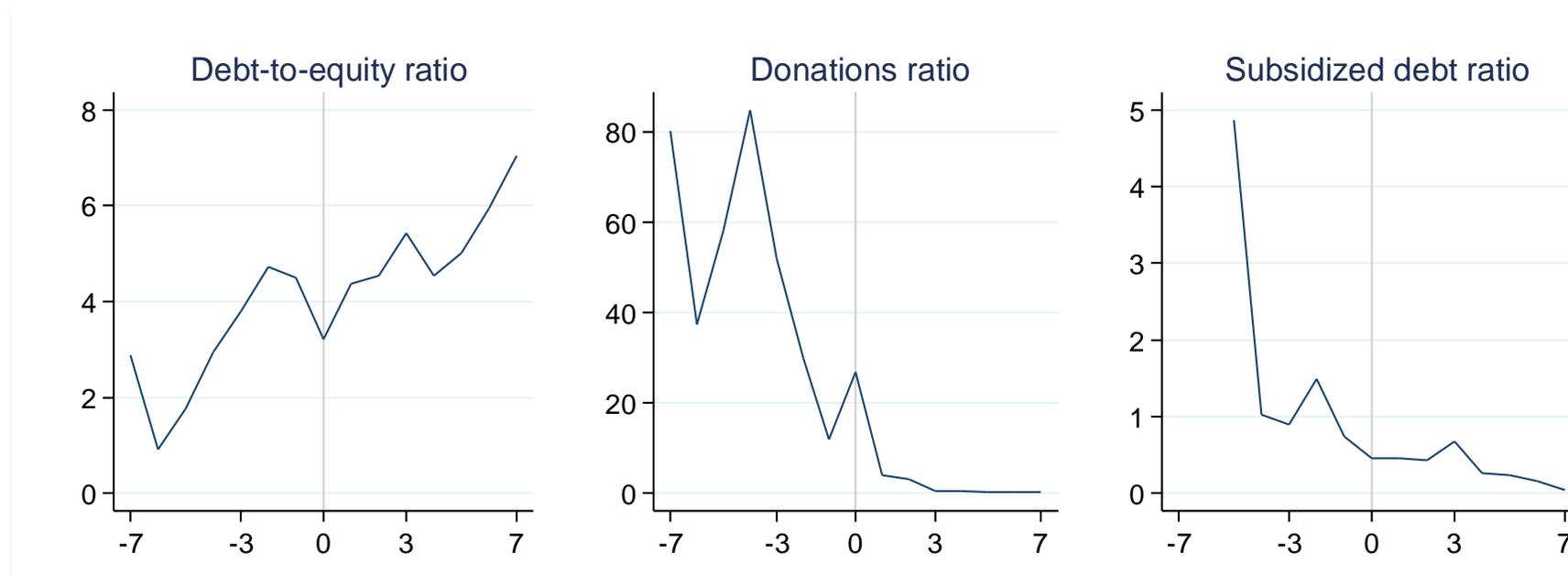
Panel B. Mean values for deposits, percentage growth figures and average loan size in an interval $[t_0\text{-}7; t_0\text{+}7]$ around transformation
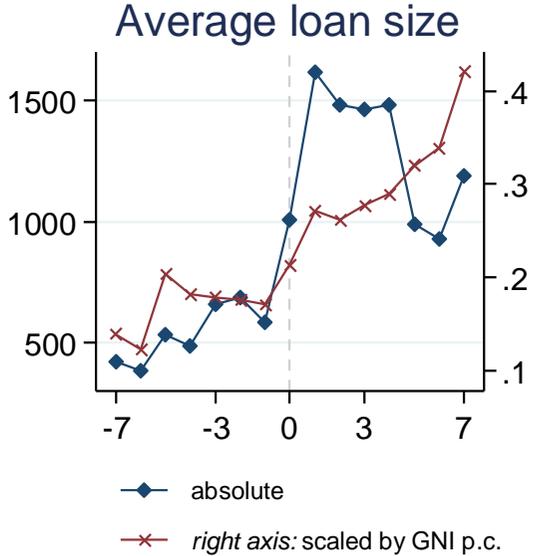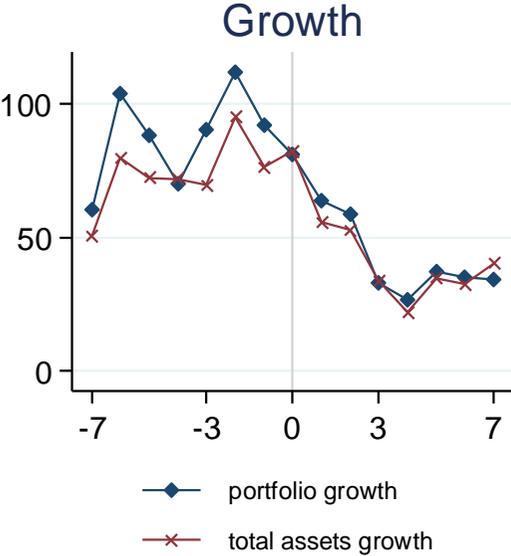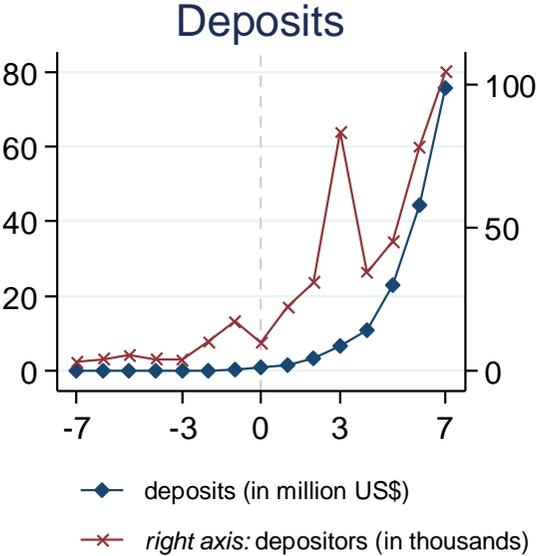
Table 6. Average abnormal values over interval $[t_0;t_0+7]$ with different underlying regressions

Panel A. Results of robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Income / interest rates							
Portfolio yield nominal	-4.16	-7.13	-4.67	-3.77	-6.27	-0.12	**-3.89**
Portfolio yield real	-5.34	-8.43	-5.99	-4.01	-7.77	0.31	**-6.15**
Funding costs							
Cost of funds ratio	-0.20	-1.91	-1.94	-0.25	-2.43	-1.70	**-4.35**
Operational costs							
Operating expense ratio	2.04	-5.68	-2.68	-5.67	-6.96	-0.23	**-1.11**
Loan losses							
Par 30	0.72	0.93	0.61	1.34	1.05	0.36	**-0.00**
Write-off ratio	-0.21	0.38	-0.36	0.42	0.32	-0.28	**-0.63**
Overall profits							
ROE	-6.33	-8.70	-8.00	-8.41	-6.61	2.92	**5.56**
ROA	-6.72	-3.27	-2.37	-0.52	-1.94	-1.99	**-3.40**
OSS	-19.98	-13.28	-8.50	-5.92	-10.58	-6.76	**-9.69**

Panel B. Overview of regression models used as robustness checks

* Random effects model, where α_i are random MFI effects. The Hausman test for consistency does not reject models for real portfolio yield, cost of funds, operating expenses, Par 30, write-off ratio, ROA and OSS (at 5% level)

** Only for years with a minimum of 10 observations for transformed and untransformed MFIs

Model #	Estimated specification	Remarks
Model 1:	$Y_{i,t} = \alpha + \beta X_{i,t} + \gamma GNI_{i,t} + \varepsilon_{i,t}$	no MFI fixed effects or year dummies
Model 2:	$Y_{i,t} = \alpha_i + \theta_t + \varepsilon_{i,t}$	only MFI fixed effects and year dummies
Model 3:	$Y_{i,t} = COUNTRY_k + \theta_t + \beta X_{i,t} + \gamma GNI_{i,t} + \varepsilon_{i,t}$	MFI fixed effects replaced by country fixed effects
Model 4:*	$Y_{i,t} = \alpha_i + \theta_t + \delta\, REGULATION_i + \varepsilon_{i,t}$	independent variable: dummy for being regulated
Model 5:	$Y_{i,t} = \alpha_i + \theta_t + \xi\, LOG(DEPOSITS)_{i,t} + \varepsilon_{i,t}$	independent variable: log deposits
Model 6:**	$Y_{i,t} = \alpha_{i,t} + \beta_t X_{i,t} + \gamma_t\, GNI_{i,t} + \varepsilon_{i,t}$, $\quad for\ t \in T = \{2002, \ldots, 2006\}$	separately run for each year t = 2002, ..., 2006
Model 7:	$Y_{i,t} = \alpha_i + \theta_s + \beta X_{i,t} + \gamma GNI_{i,t} + \varepsilon_{i,t}$	preferred specification from Table 4