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The Relationship between Relative Maturity and Depth of Outreach of Microfinance Institutions

Bachelor Thesis in Banking and Finance

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Full Text Version

CMF Thesis Series no. 22 (2017)

February 2017

Center for Microfinance Thesis Series

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Executive Summary

This thesis is concerned with the interaction of institutional maturity and depth of outreach of microfinance institutions. It consists of:

1. A literature analysis of the concepts *institutional maturity* and *depth of outreach*, presenting an overview and interpretation of previous work on the individual topics and their interaction
2. An empirical analysis of the relation between institutional maturity and depth of outreach, using cross-sectional data from 2013 from the Microfinance Information eXchange

The first section argues, that institutional maturity can be seen as the degree to which an institution can sustainably perform its function. Further, it is discussed why this definition implies, that mature microfinance institutions should have a strong social performance.

The tiered framework of relative institutional maturity, suggested by e-MFP (2013) and MicroRate (2013), is presented. The influence of an institutions sustainability, size and transparency on the tier-classifications according to this framework is explored. Finally, the difficulties of measuring social performance are discussed. Depth of outreach is evaluated as one way of measuring social performance.

The second part, empirically tests how institutional maturity and depth of outreach are related in four different regions.

1. The thesis aims to show, that there is a negative relationship between institutional maturity and depth of outreach.
2. It is expected that size is the only dimension of institutional maturity affecting depth of outreach.
3. This negative relationship is expected to come from a large proportion of small, and hence immature, institutions which are exclusively serving one group of excluded clients and thus have a very large depth of outreach.

It is revealed that in Latin America and the Caribbean, transparency, rather than size, is the key factor for the determination of depth of outreach. How increasing institutional maturity affects depth of outreach seems to depend on the level of institutional maturity. For immature institutions, an increase of institutional maturity is connected to a decrease in depth of outreach. For mature institutions, this effect is reversed. Additionally, the thesis confirms, that the level of depth of outreach, as well as its interaction with institutional maturity, greatly depends on the region.

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List of Abbreviations

A	Africa
ADB	Asian Development Bank
ALB	Average Loan Balance per Borrower
AUM	Assets under Management
CGAP	Consultative Group to Assist the Poor
DFI	Development Finance Institutions
EAP	East Asia and the Pacific
EECA	Eastern Europe and Central Asia
FEMALE	Proportion of Female Borrowers
FOCUSFEMALE	Proportion of MFIs with FEMALE > 0.8
FOCUSRURAL	Proportion of MFIs with RURAL > 0.8
GNI	Gross National Income
LAC	Latin America and the Caribbean
MENA	Middle East and North Africa
MFI	Microfinance Institution
MIV	Microfinance Investment Vehicles
MIX	Microfinance Information eXchange
NBFI	Non-Bank Financial Institutions
NGO	Non-Governmental Organization
ROA	Return on Assets
RURAL	Proportion of Rural Borrowers
SA	South Asia
SPTF	Social Performance Task Force
UNDP	United Nations Development Program
USSPM	Universal Standards for Social Performance Management

1 Literature Analysis

This thesis explores the relationship between institutional maturity and depth of outreach in microfinance institutions (MFIs). Part 1 gives an overview on the literature on these two concepts and looks at the results of existing studies looking at this interaction. Further, a hypothesis is developed and subsequently tested in part 2. The variables and models used for testing the hypotheses are introduced and explained at the end of part 1.

1.1 Institutional Maturity

Section 1.1 introduces the concept of institutional maturity. It explains how the focus on institutional maturity emerged historically and defines the term MFI. It then defines the terms sustainability, capacity, development and maturity in the context of microfinance institutions. Different ways to measure institutional maturity are presented and the tiered framework by e-MFP (2013) and MicroRate (2013), which is subsequently used in the empirical section, is explained and discussed.

1.1.1 Introduction: History and Definitions

Section 1.1.1 gives a brief overview on the history of microfinance. It focuses on different paradigms, which have emerged over the past decades, and shows how the creation of mature institutions has become a key objective of microfinance. Then it goes on in to clarify how the terms microfinance and microfinance institutions are used in this thesis.

1.1.1.1 History and paradigms

The predecessors of modern microfinance are described in Ledgerwood (1998). Informal and community-based financial services providers have traditionally served the demand for credit and saving services by women and men at the bottom of the pyramid. Later, they were supplemented by government or donor-financed organizations, aiming to achieve broader financial inclusion. Due to large loan losses and the frequent need for recapitalization, those early public and charitable providers came increasingly under pressure in the late 1970s.

According to Robinson (2001), this critique paved the way for the success of specialized financial services providers for low-income households like the Grameen Bank in Bangladesh or ACCION in Latin America. Their innovative business models include, but are not limited to, the famous peer-group lending as popularized by Mohammed Yunus (Yunus, 1998). Non-

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governmental organization (NGOs) and development organizations across the world started copying and improving those strategies.

With those new tools at hand, some of the new MFIs managed to provide their financial services at full cost recovery. This allowed them to move away from subsidized credit or grants towards free-market funding and led to a paradigm shift in microfinance. While the former poverty lending approach focused on providing cheap credits through subsidized loans, the newly emerging financial systems approach empathizes the importance of creating sustainable financial institutions and a broader financial ecosystem (Ledgerwood, Earne, & Nelson, 2013) (Robinson, 2002).

Lützenkirchen & Weistroffer (2012) call this process “commercialization” and show that, statistically, this development is visible by the institutional transformation of MFIs from NGOs to regulated banks or non-bank financial institutions (NBFI). According to Ledgerwood & White (2006), one key advantage of this transformation is the possibility to mobilize public savings. As more and more MFIs are moving forward on the way to financial sustainability, there are also a growing number of commercial banks downscaling into microfinance. It can therefore be stated, that the task to achieve financial inclusion are gradually transferred from charitable organizations towards market forces.

Today, a more holistic view is emerging: Some investors call their activities, including investments in microfinance, “impact investing” (Höchstädter & Scheck, 2015). This includes all types of investment with a social or environmental impact and allows for investors to invest in different financial services providers, with a broad range of business models. Consequently, microfinance today is all of the above: It is lending to the low income clients, while creating sustainable financial institutions and promoting a broad ecosystem of financial services in emerging economies (Dominicé, 2012).

This thesis explores, weather there is a trade-off between the main objective of the poverty lending approach, namely increasing outreach to the poor, and the main objective of the financial systems approach, i.e. the development of mature financial institutions.

1.1.1.2 Definitions

Microfinance

The definition of microfinance as the provision of financial services for people excluded by mainstream financial institutions (e.g. Diekmann, 2007) falls short of todays reality in the market. Many mainstream financial institutions have included microfinance operations into their business model (United Nations, 2006). This document will therefore follow the definition of Ledgerwood (1998), defining Microfinance as “the provision of financial

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services to low-income clients including the self-employed“ (p. 1). In the following chapters, this target segment of the population will be simply called “the poor”.

Microfinance institutions

MFIs are institutions providing financial services to poor people, typically unserved or underserved by traditional financial institutions. It is technically not quite correct to talk about MFIs when talking about all institutions offering microfinance services, since some of those institutions would not consider themselves MFIs but rather commercial banks offering microfinance services. United Nations (2006) addresses this terminology issue on page 5. Since MFI is the most common term used for institutions connected to microfinance services, this term is subsequently used for all institutions providing microfinance services throughout the literature analysis section of this thesis. The empirical part is then focusing only on MFIs managing specialized microfinance portfolios, to avoid a possible selection bias (see 2.1.1 and C.1). The Consultative Group to Assist the Poor (CGAP) (2010) defines specialized microfinance portfolios as having an average loan balance per borrower of less than 250% of the gross national income (GNI) adjusted average yearly income in the respective country.

Ledgerwood, Earne, and Nelson (2013) further make a distinction between community-based providers and institutional financial services providers in financially underserved communities. Community-based providers are individuals, indigenous groups, or facilitated groups trained by external agencies. All those providers have in common that they are informal businesses and are thus not legally licensed, have few expenses, and provide services primarily within the group itself. They cannot be considered a formal institutions and is therefore are referred to as MFIs in this thesis.

The term MFIs is used for formalized institutional providers, which are usually registered and often supervised or regulated (Ledgerwood et al., 2013). Even though community based providers are an important part of the microfinance ecosystem, they are not subject to this thesis and will not be analyzed more closely.

1.1.2 Institutional Maturity

As explained in the section 1.1.1, developing financial institutions is one of the key objectives of microfinance Ledgerwood (1998). Institutional development can be characterized in many different ways. Section 1.1.2 explains the term institutional maturity. It shows, that institutional development of MFIs is often seen as their movement across types, often characterized by its legal form (e.g. Champion & White, 1999). It then goes on to assess alternative ways of modeling the institutional development, namely so-called tiered

approaches. One specific approach, proposed by (e-MFP, 2013) and (MicroRate, 2013), is explained in detail.

1.1.2.1 Capacity, sustainability, development and maturity

Institutional maturity is a key concept in this thesis. However, no standardized definition of the term exists. To clarify what is meant by institutional maturity in this thesis, the terms, capacity, sustainability, development are defined and it is explained how they can be combined to a definition for maturity.

Capacity and sustainability

United Nations Development Program (UNDP) (1998) defines institutional capacity as “the ability of individuals or organizational units to perform their functions effectively, efficiently and sustainably” (p. 10). At the same time, Kayaga, Mugabi, & Kingdom (2013) found that “institutional sustainability” is often defined as the “capacity of an institution to generate a minimum level and quality of valued outputs over the long term“ (p. 3). The reciprocal use of the terms *capacity* and *sustainability* in both definitions shows how closely related the two concepts are. Yet, while the focus in *institutional capacity* lies on the institution’s abilities, “institutional sustainability” puts longevity at the center.

Development

Buyck (1991) defines institutional development as “the creation or reinforcement of the capacity of an organization to generate, allocate and use human and financial resources effectively to attain development objectives“ (p. 5). McGill (1995) adds, that “institutional development must have a central concern for ensuring sustainability of the increased institutional capacity“ (p. 71). Therefore, *institutional development* can be seen as the sustainable development of institutional capacity.

Maturity

According to the Oxford English Dictionary (n.d.), *maturity* can be defined as „fullness of development“. Following the definition of development from above, *maturity* is thus made up of capacity and its sustainability. In this thesis, the *level of institutional maturity* refers to the level of development of its capacity and its sustainability, i.e. to the degree to which it is able to sustainably perform its function.

1.1.2.2 Institutional development and categories of MFIs

Institutional development and types

There are many researchers and practitioners in microfinance and the broader development community argue that the path for development of MFIs is to transform from NGOs into regulated financial institutions like banks or NBFIs (e.g. Campion & White, 1999; Asian Development Bank (ADB), 2000; Ledgerwood & White, 2006).

Campion & White (1999) argued already back in 1999, that NGO-MFIs face various growth impediments which leads them to transform into regulated financial institutions or spin-off their microfinance operations as such. Obstacles to NGO expansion include for example access financial markets, the impossibility to lever their equity base and the lack of a permission to mobilize public savings. ADB (2000) also specifically mentions the shortcomings in the capacities of NGOs to provide sustainable services to the poor. Poor governance is pointed out as the main reason and is attributed to unclear ownership-structures and the reliance on donor funds. The report highlights the importance of financial sustainability of MFIs. More recently, Ledgerwood & White (2006) makes a strong case for the commercialization of MFIs. Their book “Transforming Microfinance Institutions” explains very detailed why the creation of regulated and deposit-taking financial institutions is the way forward for the microfinance industry. They highlight three ways of achieving this: Either by transforming NGO-MFIs, by creating new financial institutions from scratch or by commercial banks downscaling into microfinance.

Lützenkirchen & Weistroffer (2012) confirmed the hypotheses of Campion & White (1999), stating that MFIs tend to transform into regulated financial institutions. Using data from the Microfinance Information eXchange (MIX), they show that there is a shift in the type of MFIs from NGOs towards NBFIs and banks between 2002 and 2010. During this period, total outreach has increased substantially. In 2010, NBFIs in total served the largest number of microfinance clients, while banks and NGOs served a similar amount of clients. With an average of about 10'000 clients per institution, NGOs and NBFIs achieved about the same level of breath of outreach, while banks served more than three times as many customers on average. Surprisingly, the dependency on subsidies seems to be decreasing across all MFI types, including NGOs. Non-profit MFIs were not less profitable over the observed timespan than their for-profit counterparts.

If the function of an MFI is to provide sustainable financial services to the poor and institutional capacity is defined as an “institutions ability to sustainably perform its function” (UNDP, 1998, p. 10), as was suggested in 1.1.2.1, the institutional capacity of an MFI can be seen as its ability to provide sustainable financial services to the poor (ADB, 2000). If

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financial performance is taken as a proxy for sustainability, the findings by Lützenkirchen & Weistroffer (2012) question whether the legal form of an MFI is a suitable measurement for its institutional maturity. In the following part, alternative approaches for measuring institutional maturity are discussed.

1.1.2.3 Tiered frameworks

The financial systems approach, as defined by Robinson (2001) focuses on institutional sustainability and outreach of MFIs as two of its main objectives. ADB (2000) names institutional capacity as key for sustainability and expanding outreach. The results of the study by Lützenkirchen & Weistroffer (2012) show no relationship between financial sustainability and the legal form of MFIs. Also breadth of outreach seems only to differ between NGOs and banks, while NBFIs are not serving more customers than NGOs on average. Furthermore, non-profit MFIs seem to be as profitable as for-profit institutions. This leads to the conclusion that other approaches than the change of legal form or profit status are needed to measure improvements in the institutional capacities, and hence institutional maturity, of MFIs. Tiered approaches offer such a possibility.

“Tier” as a noun is defined as “one of several layers or levels”, while “to tier” as a verb means to organize something in tiers (Cambridge Dictionary, n.d.). By arranging any set of objects in tiers, they are placed in a ranked order, and therefore organized on an ordinal scale (Stevens, 1946).

Ranking microfinance institutions on an ordinal scale using a tiered approach is therefore implicitly normative, suggesting a pathway for institutions on where they should be heading. This can be used for investors to rank them according to attractiveness for investment (Etzensperger, 2014) or regulators to streamline regulatory capacities and give incentives for MFIs to graduate between the defined tiers (Arun, 2005). Upper tier MFIs often have cheaper access to capital (Ledgerwood & White, 2006).

Tosun (2015) gives a comprehensive overview on different tiered frameworks used in the context of microfinance. This thesis draws on this analysis, but refrains from listing all those examples again. This thesis complements this work by focusing on different areas of application for tier-based approaches.

Applications of tiered approaches in microfinance

Commercial investments

According to Etzensperger (2014), MFIs need to operate profitably, meet regulatory requirements, have professional structures and processes in place, and fulfill accounting and risk management requirements in order to be considered investable to commercial investors. Investable MFIs can again be grouped into mature, low-risk MFIs and younger MFIs with high growth potential. Only a fraction of all MFIs are considered structurally investable, while the vast majority is not of interest to commercial investors. Most of the structurally investable institutions domestically receive investment grade ratings (BBB to AA).

Commercial investors ResponsAbility use a tiered framework with three tiers to rank MFIs according to investability. Their ranking methods are based on analyst reports and include the above mentioned criteria (Etzensperger 2014).

Symbiotics is another commercial investors using a tiered framework to evaluate investability of MFIs. Dominicé (2012) describes the Tier 3 MFIs usually depend on donations and are unlevered, with loan portfolios smaller than initial capital invested. Therefore, there is neither demand for debt-capital, as usually provided by commercial microfinance investment vehicles (MIV), nor are the MFIs able to pay market rates for this kind of capital. As MFIs reach tier 2, their loan portfolio exceeds initial capital. While they might be able to finance growth with retained earnings for some time, sooner or later they will need to move towards debt-financed growth. This debt usually comes from offshore via development finance institutions (DFIs) or MIVs. This is the most attractive stage of development for commercial investors to invest in MFIs, characterized by profitable, high growth institutions with significant capital needs. When moving towards tier 1, many MFIs acquire a banking license. Additionally, tier 1 MFIs sometimes did not start out as MFIs, but as commercial banks downscaling into microfinance. Therefore, a large part of their debt at this stage is financed by deposits.

These examples give an idea of how two specific commercial investors use tiered frameworks. It is not analyzed here whether this is an adequate representation of the population of commercial investors. The classification mentioned criteria are thus not necessarily generalizable.

Governments, DFIs and social funds

The main objective of commercial investment funds is to guarantee an adequate return to their private or institutional clients. Governments and DFIs on the other hand use public money, to facilitate developmental programs in emerging countries. DFIs are usually set up by governments or supranational organizations and are also referred to as international financial

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institutions. Their role is to help MFIs to become sustainable. In addition to governments and DFIs, there are private social funds which focus mainly on social objectives. Likewise, they can offer capital to MFIs below market conditions, because their investors do not expect a market rate financial return (Goodman, 2003).

Many of those organizations have committed themselves to institutional capacity building along the lines of the financial systems approach (Gross & de Silva, 2002). The microfinance community has criticized DFIs continuous extensive involvement in mature MFIs for crowding out private investment. If they stick to their mission to help institutional development in MFIs, their subsidized capital is more effectively employed helping the development of promising young institutions with limited access to free-market capital. As soon as they are at a stage where they attract enough commercial investment to reach their objectives, governments and DFIs should reduce their involvement (von Stauffenberg & Rozas, 2011).

To the knowledge of the author of this thesis, tiered frameworks for classifying MFIs are not commonly used by the development community. Changing this could be useful to categorize which MFIs still need below market rate capital and which do not. The e-MFP Action Group of Investors in Tier 2/3 MFIs, consisting primarily of social funds, has defined a comprehensive, easy-to-use tiered framework (e-MFP, 2013). This framework is discussed in detail in the following paragraphs.

One specific tiered framework

Different actors define tiers very differently. Regulatory institutions focus their definitions on legal form and areas of activities (e.g. deposit taking or not deposit taking) of MFIs (Steel & Andah, 2003). Commercial investors base rankings on sophisticated analyst reports which are usually not available to the public (Etzensperger, 2014). As for-profit capital providers, they are less interested in their legal form, but more in their financial performance and sustainability. As mentioned in section 1.1.2.2, (Lützenkirchen & Weistroffer, 2012) show that there does not necessarily need to be a correlation between type and financial performance.

The framework suggested in e-MFP (2013) and MicroRate (2013) classifies MFIs into tiers according to their relative institutional maturity. The following section is mainly based on those two papers.

MFIs can be categorized and ranked along three simple, comprehensive and practical dimensions: Sustainability, size and transparency. First, the sustainability of an MFI is intended to measure its financial capacities and its resilience against external and internal shocks. It is quantified via its return on assets (ROA). Second, the size of an MFI is an

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indicator for its ability to serve a large number of clients and managing a large, well-diversified portfolio. It is measured by the dollar value of its assets under management (AUM). Third, the ability of an MFI to provide reliable information on its operations to its various stakeholders is measured along the transparency dimension. It is quantified by the level of third-party oversight it exposes itself to (i.e. ratings, audits and regulation). Legal status is intentionally left out, because it differs greatly between countries, making cross-country comparisons difficult.

Table 1: Criteria for tier compliance at each dimension of institutional maturity

	Tier 1	Tier 2	Tier 3
Description	Mature, financially sustainable, and large MFIs that are highly transparent	Small or medium sized, slightly less mature MFIs that are, or are approaching, profitability	Start-up MFIs or small NGOs that are immature and unsustainable
Sustainability	(i) Positive ROA for at least 2 of the last 3 years AND (ii) No ROA < -5% in the last 3 years	(i) Positive ROA for at least 1 of the last 3 years and other years > -5% OR (ii) Positive trend in ROA in last 2 years and ROA > -5%	The rest
Size	AUM > \$50 million	AUM between \$5 and \$50 million	AUM < \$5 million
Transparency	(i) Regulated financial institution OR (ii) Rated at least once in the last 2 years	Audited financial statements for at least 3 years	The rest

Source: MicroRate, 2013

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A tier 1 MFI is financially sustainable, mature and highly transparent. It has a positive ROA for at least two of the last three years as well as no ROA below -5% for at least 3 years. Also, it manages assets worth more than USD 50 million and it is regulated, or rated at least once in the past two years.

A tier 2 MFI is a close to profitable, small to medium sized institution. To be classified as tier 2 MFI, ROA needs to be higher than -5% for at least 2 years. In addition, ROA has to be positive for at least one in the last three years or trending upwards for two years. A tier 2 MFI manages assets worth at least USD 5 million and has provided audited financial statements for all three preceding years.

Finally, a tier 3 institution is unsustainable, small or intransparent and hence immature. There are three possibilities for a MFI to be classified as tier 3 institution: First, it can have either an ROA of less than -5% at least once in the past three years, or no positive ROA for three years, as well as no upward trend in ROA in the past two years. Second, it manages assets worth less than USD 5 millions, or third, it fails to provide audited financial statements for at least one of the three preceding years.

Tosun (2015) discusses the advantages of this particular tiered framework in detail. The advantages include the following points:

1. It is easy to understand and calculate.
2. The metrics used are not restricted to microfinance but universally accepted and they are applicable for MFIs of different types and from different regions at all stages of development.
3. It is based on publically available data and therefore eliminates the need for detailed reports on individual MFIs.

Due to these advantages, the framework is seen as a suitable and practical measure for institutional maturity. Thus it is used for the empirical analysis of this thesis, which is looking at the interaction of institutional maturity and depth of outreach. In section B of the appendix, there is a detailed description of how this framework is implemented in part 2 of this thesis. The implementation intends to follow the framework as suggested by e-MFP (2013) and MicroRate (2013) and described in this chapter as closely as possible. Some minor additional definitions and adaptations were necessary to make it fit to the available data (see Appendix B).

1.1.3 Summary

Institutional maturity is the result of institutional development (Oxford English Dictionary, n.d.). This can be seen as the increase of institutional capacity and sustainability. Differently put, it is the ability of a institution to perform their function on a certain level and quality over the long term (UNDP, 1998; Kayaga et al., 2013; Buyck, 1991; McGill ,1995). In the literature on microfinance, it is often characterized as the commercialization of MFIs and their transformation from NGOs into regulated financial institutions (e.g. Champion & White, 1999; ADB, 2000; Ledgerwood & White, 2006).

There are studies showing that the change in legal status is not necessarily a good indicator for institutional development. While banks have are larger in size and therefore have a greater breath of outreach than NGOs, this is not the case for NBFIs. Additionally, for-profit MFIs are not more profitable than non-profit institutions (Lützenkirchen & Weistroffer, 2012). But there are other frameworks which are ranking MFIs according to different characteristics.

Commercial investors, which represent the largest part of the international investors community, are exclusively targeting top-tier MFIs . This incentivizes MFIs to move up the tier-ladder to access this almost unlimited source of capital (Etzensperger 2014; Dominicé, 2012).

Finally, the objective of many development-oriented investors is to help MFIs along the path of institutional development (Gross & de Silva, 2002). This suggests, that also the development-community is interested in creating as many top-tier institutions as possible, even though they rarely use tiered frameworks explicitly.

(MicroRate, 2013) and (e-MFP, 2013) propose a universally applicable and practical definition of three tiers of MFIs along the three dimensions sustainability, size and transparency. It allows to compare institutional maturity of individual institutions across countries and types and has the advantage that it can be applied easily for large datasets without detailed analyst reports for individual institutions. This latter framework is operationalized in Appendix B and used in part 2 of this thesis.

1.2 Social Performance and Depth of Outreach

Institutional capacity has been defined as the ability of an institution to effectively and efficiently perform its function. As has been shown in the pervious sections, the sustainable development of institutional capacity of MFIs is a key objective f microfinance. Hence, a main objective of stakeholders in microfinance is to enable MFIs to more effectively and efficiently perform their function.

In this section it is argued, that double bottom line institutions have a financial as well as a social function. It is discussed, how the social performance can be evaluated and why it is not taken into account by common measures of institutional maturity. The key indicators used in the subsequent empirical analysis are introduced and discussed.

1.2.1 Performance

While “institutional capacity” and “institutional sustainability” are concerned with *ability* and *longevity*, “institutional performance” focuses on the actual *output*. It can be defined as a combination of the effective fulfillment of an institution’s mission, the efficient use of resources and its sustained relevance. It is often seen as a consequence of capacity. Since performance is visible and measurable, it is used to assess an institutions capacity (Lusthaus, Anderson, & Murphy, 1995). While there is also research indicating that there is not necessarily a direct link between capacity and performance, they are certainly closely connected (Kayaga et al., 2013).

1.2.2 Double Bottom Line and Mission Drift

The idea of responsible investments defines return on investment not only as financial return but also as social return. This has given rise to the concept of an institution’s double bottom line (Rosenzweig, Clark, Long, & Olsen, 2004). Responsible investors are therefore interested in both financial and social performance of their investees.

For the measurement of financial performance, well-established and accepted principles have been existing for decades. Comparable standards for social performance measurement only started to emerge recently (Rosenzweig et al., 2004; International Finance Cooperation, 2012; Social Performance Task Force (SPTF), 2012). Sinha (2006) defines social performance as “The translation of mission into practice, in line with accepted social values” (p. 4). Similar definitions are used by many other researchers and practitioners (e.g. SPTF, 2012; Hashemi, 2007; Campion, Linder, & Knotts, 2008).

There is a wide spectrum of potential capital sources for MFIs. (Tulchin, 2003) finds that they range from traditional philanthropists, which are exclusively focused on the social impacts of their donations, all the way to venture capitalists, searching for the perfect financial risk-return trade-off, without regard to the social bottom line. Microfinance is able to cater to both needs, creating a financial as well as a social return. This is why it is best positioned to serve socially responsible investors, which expect a social as well as a financial return (Frank, 2008). The concept of the double bottom line is therefore of vital importance to the microfinance industry.

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The financial bottom line is better defined than the social bottom line (Tulchin, 2003; Meyer & Krauss, 2015). This can lead donors and investors to focus exclusively on the commercialization, profitability and financial self-sustainability of MFIs (Krell, 2014). The previously introduced tiered framework by e-MFP (2013) and MicroRate (2013) is such an example (see 1.1.2.3). It looks exclusively at financial variables when determining an MFI's institutional maturity. The variables used to determine the level of maturity are return on assets (sustainability), total assets (size) and whether or not they provide audited *financial* statements (transparency).

Before going into detail on what existing literature has found out about the relation between social and financial performance, the next section looks at how the social bottom line is defined.

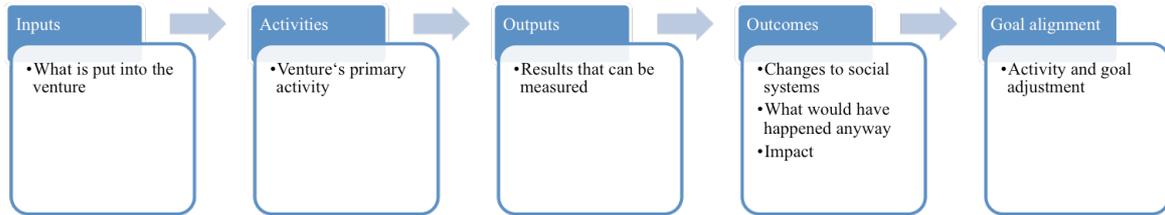
Some fear, that MFIs, as they develop, put more and more emphasis on the financial bottom line and increasingly neglect their social objectives. This phenomenon is called mission drift (Frank, 2008). Studies by Mersland & Strøm (2010) and Arnedariz & Szafarz (2011) have specifically addressed this issue. More recent studies by Meyer (2015), Martínez (2015) and Khamar (2016) are not specifically looking at mission drift, but are all interested in the relationship between social and financial performance.

1.2.3 Social Performance

According to Rosenzweig et al. (2004), institutions with a double bottom line strive towards achieving some measurable social outcome. Outcomes are specific changes in attitudes, behaviors, knowledge, skills, status, or level of functioning of the entity or individual targeted by the institutions activities. This can be a client, a community, an employee etc. The outcome is called an institution's impact, if it can be directly attributed to the institutions activities. That is, an institutions impact consists of those outcomes which go above and beyond what would have happened without the institutions activities. It is achieved via the impact value chain, which states that activities convert inputs into outputs, leading to measurable outcomes and eventually impact (Figure 1). By monitoring output and outcomes, goals and activities can then in a last step be adjusted, such as to more effectively and efficiently convert inputs into impact (Rosenzweig et al., 2004).

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Figure 1: Impact value chain



Source: Rosenzweig et al., 2004

Hehenberger, Harling, & Scholten (2013) have further developed the impact value chain set up by Rosenzweig et al. (2004). They differentiate between an organizations' planned work, consisting of inputs and activities, and an organizations' intended results, namely outputs, outcomes and impact.

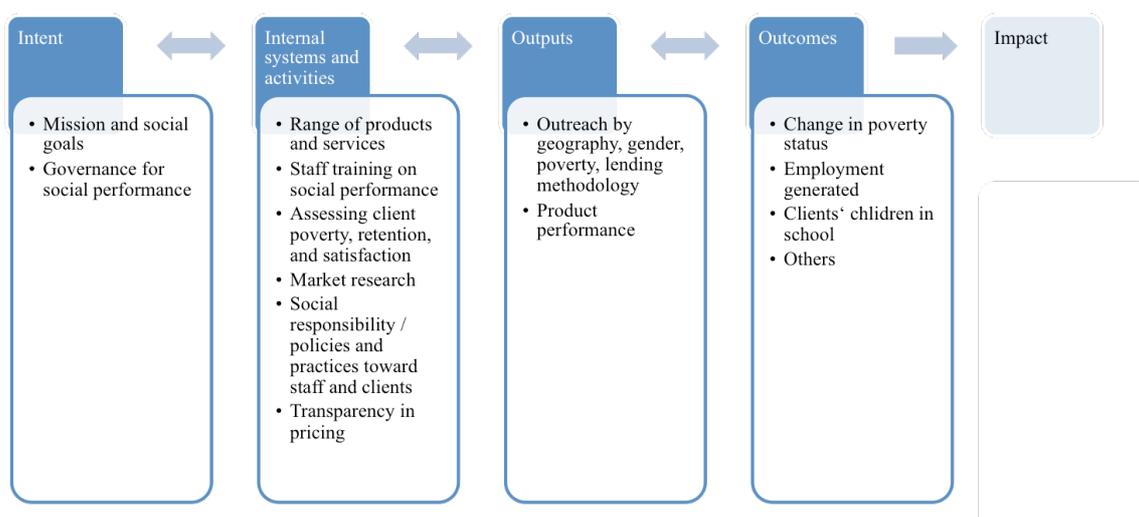
(Hashemi, 2007) lays out a similar impact value chain, calling steps 1 to 4 "dimensions of social performance". It is based on findings by Sinha (2006), which categorizes intent and activities as *process-dimensions of social performance*, as opposed to *results-dimensions of social performance*, consisting of output and outcomes of social performance. Social performance is thus not concerned with impact per se, but with the process of impact creation (International Fund for Agricultural Development, 2006).

1.2.3.1 Indicators

Ledgerwood et al. (2013) call the "impact value chain" instead "social performance process" and gives examples for common indicators to assess each step in the process.

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Figure 2: Social performance process and indicators



Source: Ledgerwood et al., 2013

Figure 2 by Ledgerwood et al. (2013) draws from the SPTF's website in 2012. The data is no longer available on the website cited in Ledgerwood et al. (2013), but it corresponds well with the sets of indicators described subsequently. It gives some examples for what MFIs measure at the different stages in the social performance process.

Intent can be measured by the mission and governance of an MFI. The range of products and services, staff training and incentives, level of knowledge of client needs and markets, social responsibility to all stakeholders and transparency are part of an MFI's internal systems and activities. Outreach measures and product performance describe output. Lastly, indicators like the change in poverty status, the employment generated and other client and employee level indicators are used to measure outcomes (Ledgerwood et al., 2013).

The assignment of indicators to the steps within the social performance process is anything but straightforward. For example, using the same five step impact value chain, Botti & Corsi (2011) classify outreach indicators as outcome indicators, while Ledgerwood et al. (2013) assigns them to outputs.

The differentiation between what Sinha (2006) calls *process-indicators of social performance* (inputs and activities) and *results-indicators of social performance* (output and outcomes) seems clearer. Process-indicators are thus indicators for processes at the organizational level, while results-indicators are providing information at client and community level. In addition, there are context-indicators, describing an MFI's environment like the region and regulatory environment in which it operates, its legal form, and portfolio characteristics.

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Yet, again, there are discrepancies between Sinha (2006) and other, similar collections of indicators. Sinha (2006) lists the percentage of clients according to gender and geography (rural vs. urban) as context-indicators describing an MFI's portfolio, while outreach-indicators are listed in the results section. Meyer & Krauss (2015) and Ledgerwood et al. (2013) assign the number of female and rural clients to the outreach indicators.

The MIX differentiates in Krell (2014) between non-time-bound profile indicators, and annually reported, time bound results indicators. Krell (2014) assigns each indicator collected by the MIX to one of the six categories of the universal standards for social performance measurement (USSPM) (SPTF, 2012). The USSPM have been developed by the SPTF, a group of experts from many institutions active in microfinance. They have defined a set of voluntary standards which every MFI should adhere to when managing social performance.

The six categories are:

1. Define and monitor social goals
2. Ensure board, management, and employee commitment to social goals
3. Treat clients responsibly
4. Design products, services, delivery models and channels that meet clients' needs and preferences
5. Treat employees responsibly
6. Balance financial and social performance

1.2.3.2 Outreach

It follows from the definition of social performance as the translation of mission into practice, that outputs and outcomes, or results, cannot be assessed without also looking at an institutions mission. Sinha (2006) points out that the proposed set of indicators assume generic social values and may have to be adjusted depending on the institution's mission. For example, assessing the poverty status of borrowers in an institution which does not have a poverty target is of only limited value (Krell, 2014).

One set of indicators, which appears in all the above-mentioned works, are outreach indicators. They are of particular interest to this thesis, because much of the work on mission drift and the relation between social and financial performance has used outreach indicators as measure for social performance (e.g. Meyer, 2015; Martínez, 2015; Mersland & Strøm, 2010; Arnedariz & Szafarz, 2011).

Woller (2006) identifies two groups and six categories of outreach:

Social value of outreach:

1. Breadth of outreach: Size or scale of the institution. It is measured by the number of clients served.
2. Depth of outreach: Value attached to the gain of a client. It is assumed that the poorer the client is, the greater the value per unit of gain. Possible indicators are average loan size of new clients (as percentage of GNI per capita), percentage of female clients and percentage of rural clients.
3. Length of outreach: Sustainability of the supply of services. This is measured by financial indicators like profit margin, return on equity or return on assets.

Customer value of outreach:

4. Scope of outreach: Number of products and services offered. More products are associated with a greater probability of meeting a client's needs. Common indicators are the number of distinct products offered or the number of clients with multiple products.
5. Cost of outreach: Price and transaction costs. This includes direct costs for the customer, as well as opportunity and indirect costs, including opportunity costs for the collateral and transportation costs to receive loans. It is measured by both financial indicators, like yield measures, as well as other indicators, e.g. the number of borrowers providing no traditional collateral.
6. Worth of outreach: The value of the products and services consumed and willingness of clients to pay. It is a function of benefits derived from consumption. Indicators include client retention rate and loan loss rate.

In contrast, Quayes (2011) only names breadth and depth dimension of outreach. This is the more common approach (e.g. Iftekhara, Abul, Yusnidah, Jamaliah, & Salleh, 2016; Sinha, 2006; Dominicé, 2012) and it fits better to the classification of outreach indicators as results-indicators. In the remainder of this thesis, the term outreach is used only for those two dimensions.

Outreach belongs to the results-category, i.e. outputs or outcomes, according to all the formerly mentioned works. It is important to note that no statement about social performance can be derived from outreach measures without also looking at the mission of the concerned MFIs. This is disregarded by some researchers. For example, Mersland & Strøm (2010) claim that “the mission of all MFIs is to provide banking services to the poor, that is, to lend very small sums to very poor borrowers“ (p. 28). They further assume that mission drift occurs, when “an MFI leaves the poor customers segment”, which they call a “general

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agreement in the microfinance industry” (Mersland & Strøm, 2010, p. 28). This negates the paradigm shift in explained in section 1.1. Over the past decade, MFIs have been changing their focus from serving as many poor people as possible with cheap credit, to becoming sustainable financial institutions and to creating an inclusive financial sector (Dominicé, 2012). MFIs have thus been broadening their objectives towards providing financial services in a transparent, inclusive and equitable manner (Aizawa, Dorasil, Grigoryeva, Miller, & Van, 2011). It has to be concluded, that outreach, and particularly depth of outreach, is a very incomplete measure for social performance. Depth of outreach should not be attributed to social performance without regard to an MFI’s goal.

This said, many stakeholders are still interested in depth measurements of outreach. A stakeholder perception analysis based on qualitative primary and secondary data sources (Moser, 2013, p. 194) has found that financial inclusion, defined as expanding financial services to underserved poor, has for most stakeholders remained the most important concept for their involvement in microfinance. Only poverty alleviation is named as equally important to stakeholders, while this is often relativized due to the lack of evidence for a causal relationship with microfinance.

1.2.3.2 Depth of outreach and indicators

In the remainder of this thesis, the focus lies on the depth of outreach of MFIs. For the above-mentioned reasons, a large depth outreach is neither a necessary nor a sufficient condition for a good social performance. Yet, as long as increasing financial inclusion is the main goal of a large share of microfinance stakeholders, it remains an issue of great interest.

Average loan balance

The most common proxy indicator to measure depth of outreach is average loan balance per borrower (ALB). Sometimes it is made comparable between countries by dividing it either by the countries gross domestic product per capita (von Stauffenberg, von Stauffenberg, Rodriguez, Spradlin, & Bryant, 2014) or GNI per capita (Meyer, 2015). It is often used as a proxy for the poverty level of the clients (e.g. Moser, 2013; Mersland & Strøm, 2010; Cull, Demirguc-Kunt, & Morduch, 2007; Meyer, 2015). Yet, there are many limitations to this metric. Arnedariz & Szafarz (2011) explains the problem of *cross-subsidization* and *progressive lending*. *Cross-subsidization* means that MFIs with a poverty target might be serving wealthy clients to cross-subsidize their operation to the poor and increase their depth of outreach to clients they could not previously afford to serve. *Progressive lending* is a strategy deployed by MFIs, where loan sizes are increased with every new loan, allowing them to test creditworthiness with little risk before lending out larger

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sums. This can lead to MFIs with high borrower retention rates (which is one goal named in the USSPM (SPTF, 2012)) to have larger average loan sizes. The same two reasons for rising ALB are also discussed in Helms (2006).

Von Stauffenberg et al. (2014) additionally point out, that consumer credits are generally smaller than productive loans. Using ALB as proxy for client poverty level could therefore lead to the conclusion, that MFIs focusing on consumer credits serve poorer clients.

Sinha (2006) gives an overview on direct depth of outreach measures, e.g. percent of clients in areas with lower than average–socio-economic development or percent of client households without former access to formal credit. Directly measuring depth of outreach requires client level data, which is not as readily available. Meyer & Krauss (2015) have suggested the following set of quality criteria for indicators:

1. Comparability
2. Independence
3. Standardization
4. Transparency
5. Credibility
6. Absence of bias
7. Measurability
8. Reliability
9. Validity
10. Timeliness

A description of what the 10 quality criteria for social performance measurement in microfinance refer to can be found in Meyer & Krauss (2015) on page 13. The concerns mentioned above suggest, the validity of ALB as proxy for depth of outreach is questionable. The other criteria seem to be well fit.

Exploring the relationship between ALB and client poverty with a rigorous empirical analysis would be of great value for further research based on ALB or on results from previous research based on this indicator.

Share of female and rural clients

Woller (2006) mentions the proportion of female and rural clients as possible measures of depth of outreach. The focus of MFIs on rural and female clients dates back to its inception in the 1980s, with pioneer organizations like the Grameen Bank serving almost exclusively women in rural areas (Auwal, 1996).

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The outreach to female clients is a widely studied phenomenon. The proportion of female clients in institutions has often been taken as measure for its depth of outreach or social performance (Meyer, 2015; Martínez, 2015; Husain & Pistelli, 2016).

As explained in United Nations (2006) and Ledgerwood et al. (2013), women are much more often financially excluded than men. They are also more likely to belong to the poorest segments of society. It has also been shown that women tend to be better credit risks (Garikipati, 2008). All of those works acknowledge, that also focus on female clients can be problematic. It can lead to loan diversion, meaning that men send their wives or female relatives to access loans. Social tensions may arise if women have better access to credit than men. A summary of empirical research on the impact of microfinance on female empowerment by (Moore, 2015) states, that improved access to financial services has not improved women's position in society. This is despite all the efforts of MFIs to specifically target female clients with their products. Ledgerwood et al. (2013) thus names many extension services and preconditions, which are necessary that female clients actually benefit from the financial products offered to them.

Next to female empowerment, also rural development has always been a core objective of microfinance (Moll, 2005). Financial exclusion is more prevalent in rural areas. Before the dawn of microfinance, the distance from the next credit agency has often prevented the rural population from accessing financial services (United Nations, 2006). Additionally, the income gap between rural and urban residence is still responsible for a large share of global inequality (Young, 2013).

There is literature questioning whether the focus on rural clients by MFIs is actually benefitting those remote areas. Bateman (2012) argues that the boom-and-bust cycle introduced by the access to financial services is harming remote areas, while evidence of a positive impact on rural development is thin, if not absent. Much like is argued by Ledgerwood et al. (2013) and others in the case of focus on female clients, Marr (2012) states that for the financial inclusion of rural areas to have a positive impact on development and poverty alleviation, product design and delivery practices are an important factor.

The critical arguments above do not speak against taking the proportion of female and rural clients as an indicator for an institution's depth of outreach. They are merely stressing the point, that increasing depth of outreach does not by itself increase social performance or impact. It is undisputable that women and rural clients are generally poorer and have less access to financial services than men and rural clients (United Nations, 2006; (Moore, 2015).

Thus a large share of female and rural clients is certainly a sign for greater depth of outreach and, if managed correctly, can be the basis for better social performance.

1.2.4 Depth of Outreach and Institutional Maturity

So far it has been shown that the creation of mature and inclusive financial institutions is one important goal of microfinance. Institutional maturity is defined as an institutions ability to effectively and sustainably perform its function. As institutions with a double bottom line, an MFI's function can be seen as to generate a financial as well as a social return. Since the social bottom line is not as well defined as the financial bottom line, institutional maturity is often measured in purely financial terms. One example of this is the maturity definition suggested by e-MFP (2013) and MicroRate (2013), defining institutional maturity by its sustainability, size and transparency. The framework is based on purely financial metrics. Whether or not an institution also carries out its social function is not taken into account.

One dimension of an institutions social performance is its depth of outreach, indicating how much it is targeting vulnerable and excluded demographics. It is often proxied by the average loan balance or the share of female and rural clients, whereas the latter two are more direct and thus more robust indicators.

In the following, it is analyzed how the classification proposed by the multi-dimensional tiered framework is related to an institutions depth of outreach. The subsequent list of literature is a sample of studies which have studied the relationship between depth of outreach and each of the dimension of the framework by e-MFP (2013) and MicroRate (2013).

1.2.4.1 Depth of outreach and sustainability

Both Mersland & Strøm (2010) and Meyer (2015) use average loan size as proxy for an organizations social performance. Meyer (2015) works with data from the MIX, which is self-declared by MFIs, while Mersland & Strøm (2010) work with third-party data from rating agencies in 74 countries. Mersland & Strøm (2010) use the PPP adjusted dollar value of the average loan, Meyer (2015) looks the average loan in percentage of the countries GNI. They both find no evidence for the hypotheses, that increasing loan sizes enhances financial performance. They argue that while larger loans are less costly, they also go hand in hand with decreasing portfolio yield. The two effects work in opposite directions and are thus cancel each other out, as Meyer (2015) shows. The same holds true for the percentage of female clients of MFIs (Meyer, 2015).

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Martínez (2015) uses MIX data and 220 demographic household surveys from 74 countries to analyze the effects of outreach to women and real portfolio yield on operational self-sufficiency and return on assets, where real portfolio yield is used as proxy for rent extraction. She finds that both increasing outreach to women and real portfolio yield has positive effects on operational self-sufficiency and return on assets. Real portfolio yield is mostly increasing in the most commercialized firms. This suggests that they either offer higher quality products or they are guilty of rent extraction. Since the quality of the products offered is not taken into account by this study, the conclusion is drawn that there is not necessarily a trade off between doing good and doing well.

The three studies are just a small sample of a very long list of studies on the relationship between the financial sustainability and the depth of outreach of MFIs. The results are generally very diverse and inconclusive. There seems to be a general consensus that a focus on female clients is positively related to financial performance and thus sustainability (e.g. Martínez, 2015; Husain & Pistelli, 2016).

1.2.4.2 Depth of outreach and size

Breadth and depth of outreach are often portrayed as two very closely connected objectives, often collectively referred to simply as an institution's outreach. Outreach indicators are grouped as "results" (Sinha, 2006) or "output" (Ledgerwood et al., 2013) indicators. Little attention has been put on a possible trade-off between the two dimensions of outreach.

This is surprising, since the argument put forward in this thesis is straightforward: Many MFIs start out as NGOs or small startup NBFIs. They offer a small palette of products and are strongly focused on a specific market niche of financially excluded people. As MFIs grow, they develop new products, attract new clients and enter new markets. It is very improbable that they will stay as focused on this specific excluded group of people. Instead, it could be expected that they start to compete for a share in more developed and markets and serve wealthier clients. To the knowledge of the author of this thesis, no study has so far analyzed these possible dynamics, which is a gap this thesis intends to fill.

It is important to note that such a decrease would not mean that the absolute number of poor or excluded clients decreases or their social performance deteriorates. For example, Arnedariz & Szafarz (2011) argue, that MFIs engage in *cross-subsidization*, meaning that they include wealthy clients in their portfolio to subsidize small, and thus costly, credits to their traditional clientele.

1.2.4.3 Depth of outreach and transparency

Quayes (2011) looks at average loan balance divided by GNI per capita as proxy for depth of outreach. He finds that financial sustainability is positively related to depth of outreach at high-disclosure MFIs, while it is negatively correlated at low-disclosure MFIs. This study is also based on data from the MIX. No other study on the relationship between transparency and depth of outreach is known to the author of this thesis.

1.2.4.4 Depth of outreach and institutional maturity

Tosun (2015) is to the knowledge of the author of this thesis the only study on the effects of institutional maturity in a more holistic sense. He defines institutional maturity as suggested by e-MFP (2013) and MicroRate (2013), which is explained in detail in section 1.1.2.3 of this thesis. In a small case study of six MFIs which have moved from tier 3 to tier 1 between 2004 and 2012, he finds that average loan balance as percentage of GNI has increased as institutions moved up the tier ladder. Notable exceptions were the institutions which remained NGOs over the observed period of time: Their average loan balance as percentage of GNI has been stable or decreased.

1.2.5 Summary

The concept of a double bottom line is an integral part of microfinance. Thus the function of an MFI is to create a social as well as a financial return (Rosenzweig et al., 2004). There are many standardized metrics for the evaluation an institutions financial return (Meyer & Krauss, 2015), while methodologies to measure social return are only just about to be developed (Social Performance Task Force, 2012).

Ultimately, the social aim of an MFI is to create an impact, i.e. making some positive changes in their stakeholders lives which would not have occurred without the actions of the MFI. This is very hard to measure. An alternative is to look at social performance, which describes the process of impact creation (Hehenberger, Harling, & Scholten 2013). What the aspired impact is depends on the mission of the individual MFI (Sinha, 2006). Supposing that increasing access to financial services is one key aim for most MFIs, depth of outreach is one indicator for its social performance.

As a direct consequence, one variable to look at when determining the maturity of a double bottom line institution with a mission to increase financial inclusion should be its depth of outreach. Yet, institutional maturity is usually measured by an institutions size or legal form, without regard to the composition of their clients. Metrics for institutional maturity often measure an institutions financial maturity, but not its social maturity (e.g. e-MFP, 2013).

There are many different metrics used to quantify depth of outreach. Average loan size is the most common one (e.g. Moser, 2013; Mersland & Strøm, 2010). It is said to be related to the poverty level of the client, but there is no empirical evidence backing this claim. For this thesis, the proportion of female and rural borrowers are taken as proxy for depth of outreach. Women and inhabitants of rural areas tend to be more likely to be financially excluded than men and residents of urban areas. Also, they tend to be poorer (United Nations, 2006). It is expected that these direct measures give a more accurate picture of an institution's depth of outreach than an institution's average loan balance.

1.3 Hypothesis and Methodology

In this section, the key takeaways from the literature analysis are summarized. Following the above study of literature on institutional maturity and social performance, the hypothesis for the empirical analysis in part 2 is formulated. Further, the methodology to test this hypothesis is outlined.

1.3.1 Institutional Maturity and Social Performance: Taking Stock

In the previous sections, it was discussed why institutional maturity is important to stakeholders in the microfinance sector and how it can be measured. This was followed up by an overview on the social performance literature and how it relates to institutional maturity. It was concluded, that in a double bottom line framework, institutional maturity should postulate social performance. Yet, this is not considered by common measurements of institutional maturity. Some literature even suggests, that depth of outreach decreases as institutions mature, since they start to target a different, more affluent clientele. This phenomenon is called mission drift. How institutional maturity in financial terms, as is commonly measured, is connected to social performance, is a research area of great interest with lots of opportunities for further work.

This thesis is looking at how depth of outreach, as one way of measuring social performance, is related to institutional maturity. Depth of outreach is measured by an institution's share of female and rural borrowers, institutional maturity by its sustainability, size and transparency.

1.3.2 Model and Hypothesis

The overall hypotheses of this thesis is, that mature MFIs have a lower relative depth of outreach than less mature institutions, and that this increase is due to a large amount of small MFIs with a strong focus on one specific group of clients.

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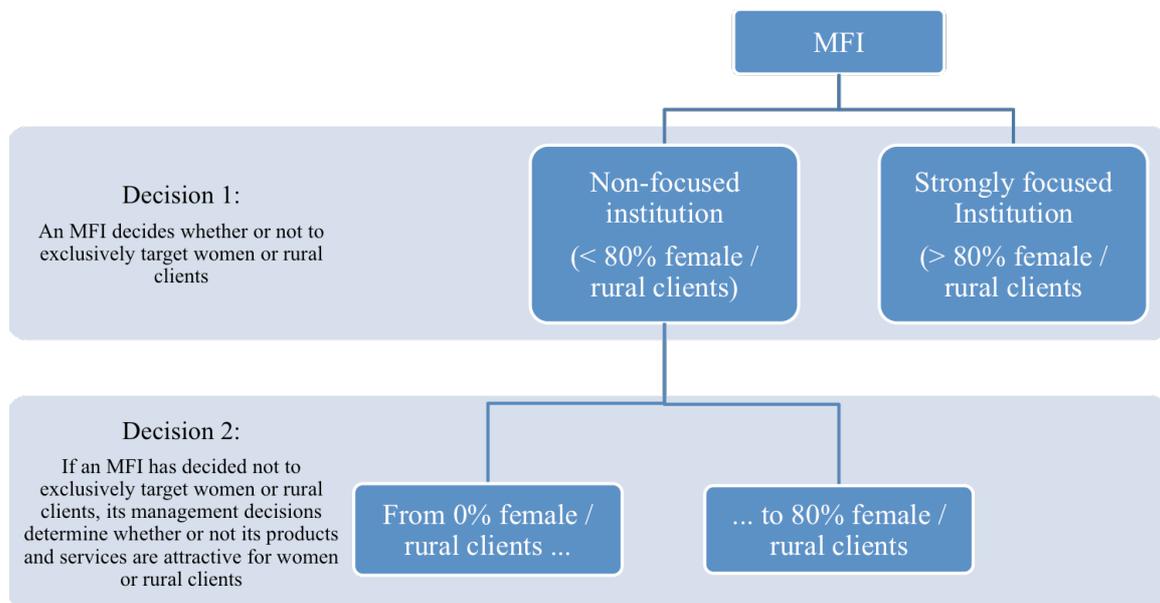
It is intuitive, that many small MFIs are serving a very narrow market niche of previously unbanked clients. Large MFIs on the other hand have a more diversified portfolio of clients, possibly including wealthier parts of the population. Thus larger MFIs are less narrowly focused on one specific group of poor costumers. This does not imply that they serve a lower absolute number of poor clients or that they serve them less well.

To test the hypothesis, a double hurdle model for the determination of depth of outreach is suggested (García, 2013). In this model, an MFI has two separate decisions to take:

1. It has to decide whether or not it is specifically focused on one group of clients (female or rural borrowers in this case).
2. If it does not to focus specifically on one of those groups, it decides whether to still try to reach out to them by designing adequate processes and products, while also serving other clients.

The model is illustrated in figure 3.

Figure 3: Double hurdle model of depth of outreach



Source: Own graphic

In a first decision, MFIs decide whether or not to exclusively focus on female or rural borrowers. An MFI is defined to be strongly focused on one of those groups of clients if at least 80% of its customers belong to this group. Strongly focused institutions are expected to be predominantly small.

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If an MFI decides not to exclusively target one of these groups, it has to choose to what degree it still targets these groups by providing adequate products and services. The second decision is believed to be independent of an institutions size and institutional maturity.

The overall hypothesis is based onto this double-hurdle-model (García, 2013) and can be split up in three testable parts:

Hypothesis 1: It is expected, that depth of outreach decreases in institutional maturity. This should be visible in data as a significant decrease in the proportion of institutions with a strong focus on female and rural borrowers from tier 2 and 3 institutions to tier 1 institutions.

Hypothesis 2: This decrease is expected to be driven by an institutions size, not its sustainability or transparency. Depth of outreach is therefore expected to decrease in size, but not in sustainability or transparency. This is believed to manifest itself in a low proportion of institutions with strong focus on female and rural borrowers in large MFIs, and a high proportion of institutions with strong focus on female and rural borrowers in small MFIs.

Hypothesis 3: Among non-focused institutions, there is no reason to believe, that large or mature institutions are less likely to have less female and rural borrowers than smaller or less mature institutions. Thus no difference in the mean of the proportion of female and rural borrowers among non-focused institutions is expected.

Hypotheses 1 and 2 are concerned with decision 1 in figure 3, hypothesis 3 with decision 2.

1.3.3 Methodology

The dependent variables are proportions which do reach the upper limit with positive probability (i.e. some institutions are in fact strongly focused on female or rural borrowers). This makes simple regression models inadequate. The following section is based on elaborations in Breen (1996), which discusses adequate methodologies in these circumstances.

A simple Tobit model cannot be used, since the decisions leading to a very high proportion of female or rural borrowers (decision 1 in figure 3) are expected to be quite different from those which change the proportion of female or rural borrowers from, say, 45% to 50%. E.g. the

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founder of a new institution might decide to exclusively target female borrowers which would lead to a proportion of female borrowers of close to 100%. This is very different from the decision of the board of an existing MFI to launch of a new product, which is specifically geared towards female entrepreneurs. The latter decision might increase the proportion of female borrowers by a few percent, but is improbable to lead to a very high proportion of the borrowers being female.

The analysis is therefore based on Cragg's model, looking independently at the influence of the independent variables on the probability of "participation" (i.e. to *not* be strongly focused on female borrowers) and their influence on the proportions of female and rural borrowers, given that they did participate (i.e. that they are *not* strongly focused) (García, 2013). The analysis will strictly separate those two effects and refrains from also fitting an overall model. The hypothesis is thus tested in two steps:

1. The first step is concerned with the likelihood of an institution to be strongly focused on female or rural borrowers. It is expected to decrease in institutional maturity and size, but not sustainability and transparency.
2. The second is concerned with its proportion of female and rural borrowers if it is not strongly focused. Here, no effect of any dimension of institutional maturity is expected.

1.3.3.1 Variables

The following variables are used in the analysis:

Depth of outreach

$FEMALE = \text{Percentage of female borrowers}$

$RURAL = \text{Percentage of rural borrowers}$

$$FOCUSFEMALE = \begin{cases} 1 & \text{if } FEMALE > 0.8 \\ 0 & \text{if } FEMALE \leq 0.8 \end{cases}$$

$$FOCUSRURAL = \begin{cases} 1 & \text{if } RURAL > 0.8 \\ 0 & \text{if } RURAL \leq 0.8 \end{cases}$$

Demographic data on clients (including savers etc.) is not as consistently reported as it is for borrowers. Thus the proportion of female and rural borrowers is taken as approximation of the proportion of clients from those groups.

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The values of FEMALE and RURAL were determined directly from the MIX Dataset described in section 2.2.1 and Appendix A. The cut-off for FOCUSFEMALE and FOCUSRURAL has arbitrarily been chosen at 80% of clients belonging to the respective group. Figure 7 and figure 8 in section 2.1.3 are histograms of the proportion of female and rural borrowers. It is visible, that the amount of institutions with less than 80% of female borrowers follows approximately a normal distribution, while it increases exponentially after 80%.

On an aggregate level, FOCUSFEMALE and FOCUSRURAL are to be interpreted as the proportion of institutions with strong focus on female or rural borrowers (e.g. the value of FOCUSFEMALE for a region is the proportion of institutions with strong focus on female borrowers within this region).

Institutional maturity: Discrete

Based on the framework by e-MFP (2013) and MicroRate (2013) and using the clarifications in Tosun (2015), the MFIs are classified into tiers according to their level of institutional maturity. How exactly they were classified is explained in Appendix B.

To test the hypothesis, only the difference between very mature (tier 1) institutions and others is analyzed. This is necessary to prevent overfitting and small sample sizes.

tier_sust = level of tier compliance at sustainability dimension (Appendix B.2)

tier_size = level of tier compliance at size dimension (Appendix B.3)

tier_transp = level of tier compliance at transparency dimension (Appendix B.4)

tier = lowest level of compliance from tier_sust, tier_size and tier_transp (Appendix B.1)

$$tier_sust1 = \begin{cases} 1 & \text{if } tier_sust = 1 \\ 0 & \text{if } tier_sust \neq 1 \end{cases}$$

$$tier_size1 = \begin{cases} 1 & \text{if } tier_size = 1 \\ 0 & \text{if } tier_size \neq 1 \end{cases}$$

$$tier_transp1 = \begin{cases} 1 & \text{if } tier_transp = 1 \\ 0 & \text{if } tier_transp \neq 1 \end{cases}$$

$$tier_transp1 = \begin{cases} 1 & \text{if } tier = 1 \\ 0 & \text{if } tier \neq 1 \end{cases}$$

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Institutional maturity: Continuous

Lastly, the variables determining tier_sust and tier_size are looked at on a continuous scale.

AUM = Assets under Management

ROA = Return on Assets

$$\text{Average_ROA} = \frac{(\text{ROA}_{t-2} + \text{ROA}_{t-1} + \text{ROA}_t)}{3}$$

These variables were added in order to add a test of the hypotheses which is independent of the thresholds of the used tiered framework, which are later shown to be possibly problematic (section 2.1.2). The numbers are taken from the MIX dataset described in section 2.1.1 and appendix A.

1.3.3.2 Statistic tests and models

Since the definition of institutional maturity already includes an institution's sustainability, size and transparency, no other institution-specific variables are controlled for. It would be interesting to look at the effect of legal form, profit status or borrower retention rate, which are all expected to have an impact on either institutional maturity or depth of outreach (Ledgerwood & White, 2006; Husain & Pistelli, 2016). But including these variables would lead to overfitting. The analysis of the influence of these variables is thus left to further research.

Explorative data analysis in section 2.1.3 shows, that the proportions of female and rural borrowers vary greatly between different regions. Also, in some regions, sample sizes are quite small. Fitting a large model, controlling for the regional effects, might be misleading and hard to interpret due to small sample sizes. For the sake of transparency, separate models are fitted for four different regions.

In the microfinance literature, usually six regions are regarded separately:

1. East Asia and the Pacific (EAP)
2. South Asia (SA)
3. Eastern Europe and Central Asia (EECA)
4. Latin America and the Caribbean (LAC)
5. Middle East and North Africa (MENA)
6. Africa (A)

Due to small sample sizes in some regions the regions EAP and SA (EAP/SA) as well as

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MENA and A (MENA/A) have been merged for this study.

For every region and both response variables (i.e. FEMALE / FOCUSFEMALE and RURAL / FOCUSRURAL), three independent tests are done are fitted at each step. The first one is concerned about the influence of institutional maturity (tier1). The second looks at the influence of tier 1 compliance at each of the dimensions of institutional maturity (tier_sust1, tier_size1 and tier_transp1). The third then tests the influence of sustainability and size on a continuous scale (Average ROA, AUM).

Institutional maturity and FOCUSFEMALE / FOCUSRURAL

Tests 1.1 to 1.3 are concerned with the influence of institutional maturity on the probability of being strongly focused on female or rural borrowers. Mature institutions are expected to be less likely to be strongly focused, because of the negative influence of the size of an institution.

Test 1.1

Test 1.1.1:

$$FOCUSFEMALE_{tier1} < FOCUSFEMALE_{tier2\&3}$$

Test 1.1.2:

$$FOCUSRURAL_{tier1} < FOCUSRURAL_{tier2\&3}$$

Test 1.1 is concerned with hypothesis 1. It is a test of the difference in proportions of institutions with strong focus on female and rural borrowers between tier 1 institutions and non-tier 1 institutions. The difference in proportions is determined using a Fisher test (Fleiss, Levin, & Cho Paik, n.d.). According to hypothesis 1, the proportion of tier 1 institutions with strong focus on female or rural borrowers is smaller than the proportion of tier 2 and 3 institutions with strong focus on female or rural borrowers.

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Test 1.2.

Model 1.2.1:

$$\text{logit}(FOCUSFEMALE_i) = \beta_{i,0} + \beta_{i,1} * \text{tier_sust}1_i + \beta_{i,2} * \text{tier_size}1_i + \beta_{i,3} * \text{tier_transp}1_i$$

Model 1.2.1:

$$\text{logit}(FOCUSRURAL_i) = \beta_{i,0} + \beta_{i,1} * \text{tier_sust}1_i + \beta_{i,2} * \text{tier_size}1_i + \beta_{i,3} * \text{tier_transp}1_i$$

$$i \in \{EAPSA, EECA, LAC, MENAA\}$$

Test 1.2 is concerned with hypothesis 2. It is based on a logistic regression model, estimating the influence of being tier 1 compliant at any dimension of institutional maturity on the probability of being strongly focused on female and rural borrowers. It is expected that β_2 is significantly negative.

Test 1.3.

Model 1.3.1:

$$\text{logit}(FOCUSFEMALE_i) = \beta_{i,0} + \beta_{i,1} * \log(AUM_i) + \beta_{i,2} * \text{Average_ROA}_i + \beta_{i,3} * \text{tier_transp}1_i + \beta_{i,4} * \log(AUM_i) : \text{Average_ROA}_i$$

Model 1.3.2:

$$\text{logit}(FOCUSRURAL_i) = \beta_{i,0} + \beta_{i,1} * \log(AUM_i) + \beta_{i,2} * \text{Average_ROA}_i + \beta_{i,3} * \text{tier_transp}1_i + \beta_{i,4} * \log(AUM_i) : \text{Average_ROA}_i$$

$$i \in \{EAPSA, EECA, LAC, MENAA\}$$

Test 1.3 is also testing hypothesis 2, but using continuous variables. With another logistic regression, it estimates the change in the log-likelihood of being strongly focused on female and rural borrowers that comes with one unit increase in $\log(AUM)$ (an approximately 172% increase in AUM) or a 100% increase in average ROA. It controls for the influence of being transparency-tier 1 compliant and for the interaction between the two continuous variables. It is expected that β_1 is significantly negative.

Institutional maturity and FEMALE and RURAL in non-focused institutions

Tests 2.1 to 2.3 only include institutions which are not strongly focused on female or rural borrowers, respectively. They test the influence of institutional maturity on the proportion of female and rural borrowers, given that this proportion is smaller than 80% (decision 2 in figure 3). All of the tests in this section test hypothesis 3 and no significant results are expected.

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Test 2.1.

Test 2.1.1

$$FEMALE_{tier1} = FEMALE_{tier2\&3}$$

Test 2.1.2

$$RURAL_{tier1} = RURAL_{tier2\&3}$$

Test 2.1 tests, whether the mean of the proportions of female and rural borrowers (FEMALE and RURAL) is significantly different in tier 1 MFIs than in tier 2 and 3 institutions. This is done using a t-test for the approximately Gaussian distributed proportion of female borrowers in non-focused institution. For the proportion of rural borrowers in non-focused institutions, the non-parametric Wilcoxon test is used, since the data is not normally distributed (figure 30 and figure 31 in appendix D.2; Hollander, Wolfe, & Chicken, 2013).

Test 2.2

Model 2.2.1:

$$FEMALE_i = \beta_{i,0} + \beta_{i,1} * tier_sust1_i + \beta_{i,2} * tier_size1_i + \beta_{i,3} * tier_transp1_i$$

Model 2.2.2:

$$RURAL_i = \beta_{i,0} + \beta_{i,1} * tier_sust1_i + \beta_{i,2} * tier_size1_i + \beta_{i,3} * tier_transp1_i$$

$$i \in \{EAPSA, EECA, LAC, MENAA\}$$

Test 2.2 is based on a linear regression, testing a possible influence of tier 1 compliance at each dimension of institutional maturity on the proportion of female and rural borrowers.

Test 2.3.

Model 2.3.1:

$$FEMALE_i = \beta_{i,0} + \beta_{i,1} * \log(AUM_i) + \beta_{i,2} * Average_ROA_i + \beta_{i,3} * \log(AUM) : Average_ROA_i$$

Model 2.3.2:

$$RURAL_i = \beta_{i,0} + \beta_{i,1} * \log(AUM_i) + \beta_{i,2} * Average_ROA_i + \beta_{i,3} * \log(AUM) : Average_ROA_i$$

$$i \in \{EAPSA, EECA, LAC, MENAA\}$$

Test 2.3 is again based on a linear regression. It tests for a possible influence of $\log(AUM)$ and average ROA on the proportion of female and rural borrowers. The interaction between

the variables is considered, but transparency-tier 1 compliance is not, since it did not show a significant effect in test 2.2 (appendix D.2.1).

1.4 Summary

Following the literature analysis above, the second part of this thesis is empirically testing the following claims:

1. The proportion of institutions with strong focus on female and rural borrowers decreases in institutional maturity
2. The proportion of institutions with strong focus on female and rural borrowers decreases in an institutions size, but not its sustainability and transparency
3. The share of female and rural borrowers does not decrease in institutional maturity among institutions without strong focus on this group

If this is the case, a lower relative depth of outreach in more mature institutions is not believed to be attributable to mission drift. The relative decrease can be explained by simple diversification of growing MFIs and does not lead to an absolute decrease in outreach to the poor.

The hypotheses are tested separately for four major regions, using tests of differences in proportions and population means as well as linear and logistic regressions.

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Part 1 above has provided an overview and interpretation of the literature on institutional maturity and depth of outreach. Institutional maturity was defined as an institutions ability to sustainably perform its function. A tiered framework, developed by e-MFP (2013) and MicroRate (2013) was introduced. It measures institutional maturity with an institutions sustainability, size, and transparency. The proportion of female and rural borrowers has been shown to be one way of measuring an institutions depth of outreach, which itself was suggested as one possible indicator for social performance.

Based on a double hurdle model, a hypothesis was formulated. It consists of three parts:

1. Institutional maturity, measured by an institutions sustainability, size and transparency, is expected to be negatively related to its depth of outreach.
2. It is expected that size is the only dimension of institutional maturity affecting depth of outreach.
3. This negative relationship is expected to come from a large proportion of small and immature MFIs which is exclusively serving female or rural borrowers and is thus expected to have a very large depth of outreach.

Six individual tests to verify these hypotheses were developed in section 1.3.3. Section 2.1 of part 2, presents and analyzes the dataset. The different variables of the models are explored and the characteristics of their distributions are visualized. In section 2.2, the hypotheses are tested and the results are discussed. Section 2.3 then interprets the results and draws conclusions for the validity of the hypotheses.

All statistical analysis was executed in the statistical software R (R Core Team, 2015). The tables in this thesis were formatted using the *stargazer* package developed by Hlavac (2015)

2.1 Explorative Data Analysis

In the explorative data analysis, the data used for the hypothesis tests is described and analyzed. Concretely, this section looks at how the MFIs are classified into tiers. It shows that the size dimension is the most important in determining whether or not an institution is in tier 1 or not. This is followed by an overview on the distribution of the proportions of female and rural borrowers. Lastly, the distribution of MFIs across regions and the interaction between

institutional maturity and the proportion of female and rural borrowers are visualized and discussed.

2.1.1 Dataset

For the analysis in the following sections, a MIX dataset, assembled in 2014, is used. The data is self-reported by the MFIs and thus has to be handled with caution (Gonzales & Rosenberg, 2006; MIX, 2007). It is reasonable to believe that smaller MFIs, which do not rely on external funding, are less likely to report to the MIX than larger, more commercialized institutions. Thus there might be a bias towards the latter in the dataset (Lützenkirchen & Weistroffer, 2012).

The used dataset is customized by the MIX. It contains the *Basic MIX MFI Data Set*, as well as additional social performance data. The data was assembled in June 2014 and contains observations from 1995 to 2014. In total, there are 16937 unique MFI-year-observations.

The cross-sectional model specified in the previous section is implemented for the year 2013. To determine the tiers in the year 2013, also data from 2011, 2012 and 2013 is used. The dataset includes a total of 1410 observations for the year 2013, of which one was excluded because it has obviously misreported its percentage of female borrowers.

Microfinance portfolios are defined in CGAP (2010) as portfolios with an an ALB in percent of the countries GNI-adjusted average yearly income (adjusted ALB) of less than 250%. It is explained in section 1.1.1, that non-specialized FSPs, providing microfinance services as just one of their products, are of growing importance. Commercial Banks downscaling into microfinance and MFIs diversifying their portfolios by also offering services for small and-medium sized enterprises or middle-income clients are two examples of legitimate reasons for large average loan balances of portfolios (Armedáriz & Szafarz, 2011; Ledgerwood & White, 2006).

Of the remaining 1409, only 36 report an adjusted ALB of larger than 250%. Conversely, 644 institutions report an adjusted ALB of less than 250%. 729 did not report on their average loan balance. Those numbers give reason to believe that FSPs active in Microfinance, but not specialized in it, are strongly underrepresented in the dataset. Since the MIX is specialized on providing data on microfinance services providers, it is possible that non-specialized FSPs are not as likely to report to the MIX as specialized MFIs. This could introduce a bias, which is avoided by focusing specifically on specialized microfinance services providers and leaving the study of non-specialized microfinance services providers to further research.

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Tables 7-10 in appendix C.1 show that non-specialized institutions are generally larger and much more likely to be tier 1 institutions than specialized MFIs (table 7). They tend to have a lower proportion of female as well as rural borrowers (tables 9 and 10). Thus there are obvious differences between the non-specialized FSPs and the specialized MFIs. Because non-specialized FSPs are likely to be strongly underrepresented in the sample, this could lead to results which cannot be interpreted in any meaningful way. Therefore, all observations with an adjusted ALB of larger than 250% (36) are excluded. Further, all observations which did not report on their adjusted ALB are excluded as well (729), since there is no evidence that they are specialized MFIs. This leaves 644 specialized MFIs reporting data for the year 2013.

2.1.2 Institutional Maturity

In section 1.1.2.1, institutional maturity was defined as a measure of the ability of an institution to sustainably perform its function. In 1.2.2 it was then argued, that as institution with a double bottom line, an MFI's function is to create a financial and a social return. Adapted to the microfinance industry, institutional maturity can thus be seen as an institution's ability to sustainably create a social and a financial return.

The literature cited in section 1.1.2.2 claims, that an institution's legal form or profit status is often taken as a proxy for its maturity, but that there is some evidence calling this into question (Lützenkirchen & Weistroffer, 2012). Tiered frameworks were suggested as a better measure for institutional maturity.

To measure institutional maturity, this thesis uses the tiered framework suggested by (MicroRate, 2013) and (e-MFP, 2013) and explained in section. The framework was concretized by Tosun (2015) to fit the present dataset. In this section, the most important features of the framework are mentioned again. A formal explanation of how exactly the framework was implemented for this study is described in appendix B.

The framework specifies three levels of compliance along three dimensions: Sustainability, size and transparency. Sustainability is measured by an MFI's ROA of the last three years, size is measured by its assets under management (AUM) and transparency is measured by the level of third party oversight of its financial reports and whether or not the institution is regulated and rated. To evaluate an institution's tier, the lowest level of compliance in all dimensions is taken. E.g. if an institution is eligible to be tier 1 according to its sustainability and size, but does not provide audited financial statements and, thus, does not comply with

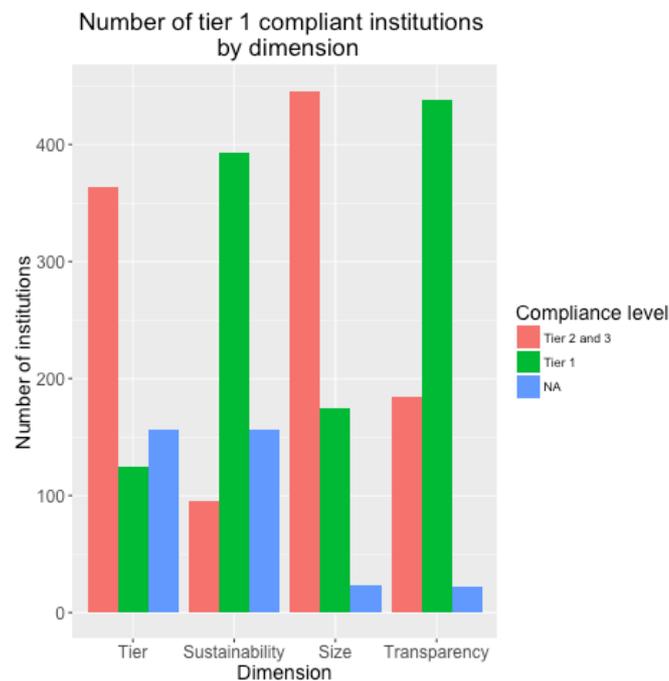
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the criteria to be tier 1 or 2 at the transparency dimension, it is a tier 3 institution. This means that the dimension with the lowest level of compliance is decisive for the tier of an institution. Hypothesis 2 states, that size is the only dimension affecting FEMALE or. This then translates into FEMALE and RURAL decreasing as institutions move up tiers (hypothesis 1). It is now explored, how much of an influence the size dimension has on the tier of an institution.

2.1.2.1 Number of institutions complying with tier 1 requirements at each dimension

All three hypotheses from section 1.3.2 are tested using cross-sectional data from the year 2013. Hence, this explorative data analysis looks at how much of the tier 1 classifications in 2013 are attributable to the size of the MFI. All institutions which did not provide information to determine their tier for this year, were excluded from the dataset. The tier for 2013 tier was determined for 488 specialized MFIs, while 156 institutions did not provide all the necessary information to determine their tier.

Figure 4: Number of tier 1 compliant institutions by dimension



Source: Own graphic based on MIX data

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Table 2: Number of tier 1 compliant institutions by dimension

Compliance Level	Tier 2 and 3	Tier 1	NA
Tier	364 (74.6 %)	124 (25.4 %)	156
Sustainability	95 (19.5 %)	393 (80.5 %)	156
Size	446 (71.8 %)	175 (28.2 %)	23
Transparency	184 (29.6 %)	438 (70.4 %)	22

Source: MIX

The tier of an MFI is determined by the lowest level of compliance of all the dimension of institutional maturity. Figure 4 and table 2 show that along the sustainability and transparency dimension the vast majority of institutions are eligible for tier 1 (80.5% and 70.4% of all institutions, for which the tier was determined). This renders those dimensions factually irrelevant for the tier determination, unless they also comply with the tier 1 criteria at the size dimension (which would make them tier 1 institutions). At the size dimension, less than a third (28.2%) of the institution are eligible to be tier 1 (i.e. manage assets worth more than USD 50 millions).

This shows that most institutions are sustainable and transparent enough to be tier 1 MFIs, but they are simply too small. Vice versa: of the 175 institutions large enough to be in tier 1, only 51 (or 29.1%) are not classified as tier 1 because their lack of sustainability or transparency. This suggests that size is the decisive dimension for the tier of an institution.

Additionally, it can be seen that data to determine the level of compliance at the sustainability dimension is most scarce. For 156 institutions, their tier could not be determined because they did not consistently report their ROA over the past three years.

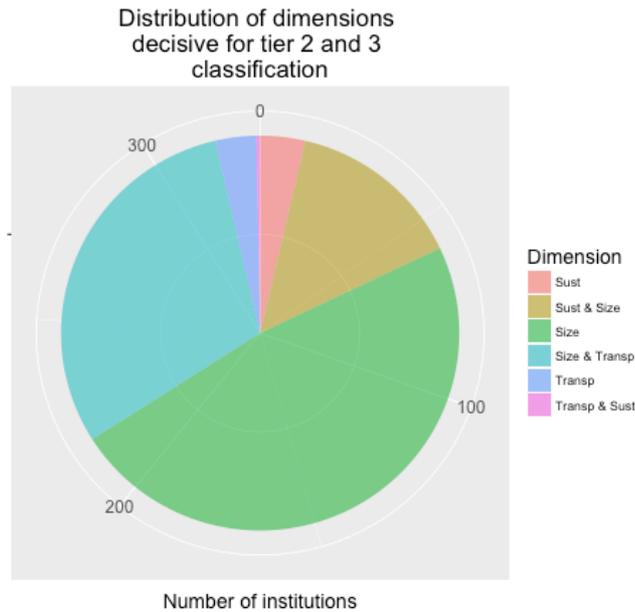
2.1.2.2 Dimensions decisive for tier 2 and 3 classifications

In a further step, those institutions for which the tier was determined are looked at more closely. More precisely, it is analyzed which dimension is responsible for an institution not to classify for tier 1. The 124 tier 1 institutions comply with tier 1 requirement at all dimensions. Additionally, there are 35 tier 2 and 3 institutions, for which the level of compliance is the same at all dimensions. Since the focus of this analysis lies in the difference in compliance among the dimensions, the 159 institutions, for which all levels of compliance agree

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(including all tier 1 institutions), are not further discussed. For the remaining 329 tier 2 and tier 3 institutions, figure 5 and table 3 show which dimension is decisive for the classification.

Figure 5: Distribution of dimensions decisive for tier 2 and 3 classifications



Source: Own graphic based on MIX data

Table 3: Distribution of dimensions decisive for tier 2 and 3 classification

	Su	Su / Si	Si	Si / T	T	T / Su	All
MFIs	12 (3.6 %)	47 (14.3 %)	158 (48 %)	100 (30.4 %)	11 (3.3 %)	1 (0.3 %)	159

Su = Sustainability, Si = Size, T = Transparency

Source: MIX

Table 3 lists the number and proportion of observations, where institutions are classified in a lower tier because of the criteria of the respective dimensions. E.g. the left entry states that 12 institutions have their lowest level of compliance at the sustainability dimension, which corresponds to 3.6% of the institutions for which the tier was determined and which are not

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on the same level of compliance at all dimensions. Figure 5 visualizes this distribution in a pie chart.

Of the total of 329 institutions, the size alone is decisive for almost half of the classifications (48%). In combination with other dimensions, the size of an institution is decisive for 92.2% of the classifications. I.e. for a large part of observations, the level of compliance at the size dimension is lower or equal to the one at the other dimensions (all green sections in figure 5). Thus the previously stated suspicion that the size dimension is the major hurdle for institutions to become tier 1 can be confirmed.

2.1.2.3 Implication of size dominance for the suggested tiered framework

It can be concluded, that the lack in size is the main reason for institutions being classified in lower tiers. Subsequently, the implication of this finding for validity of the applied tiered framework by MicroRate (2013) and e-MFP (2013) is discussed. Two alternative interpretations of this finding are compared.

Interpretation 1: The suggested tiered framework is a good measure of institutional maturity. Thus referring to the definition of institutional maturity section 1.1.2.1, the lack of sufficient size (i.e. a sufficient amount of assets under management) is the main obstacle for institutions' abilities to sustainably perform their function in the long run.

This interpretation suggests itself and, in absence of contradictory evidence, is the logical conclusion from the findings above. The framework is the result of discussions of twelve active investors in the microfinance industry, as well as comments by other stakeholders (e-MFP, 2013). It is used by MicroRate, which is a major rating agencies specialized in microfinance (MicroRate, 2013). Thus the framework can be expected to resemble the industry perception of what is needed for an institution to be considered mature.

Yet, the framework has to the knowledge of the author of this study not been subject to academic scrutiny. As mentioned in section 1.1.2.3, there are many different frameworks for measuring tiers. Some of them are explained in more detail by Tosun (2015). Hence there is no evidence that the tiered framework by MicroRate (2013) and e-MFP (2013) provides an accurate measure of "relative institutional maturity", as it is its stated objective (e-MFP, 2013).

Interpretation 2: For the tier classification according to the framework used in this thesis, all dimensions should be of equal importance. In this case, the

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thresholds defined by e-MFP (2013) and MicroRate (2013) is not an adequate measure for institutional maturity, since the level of compliance at the size dimension is decisive for a large part of tier 2 and 3 classifications. Since the majority of institutions complies with the tier 1 criteria in terms of their sustainability and transparency, but not in terms of size, the criteria for tier 1 eligibility should be adjusted. Either the threshold of assets under management worth more than USD 50 million necessary to comply with the tier 1 in the size dimension has to be lower, or the compliance criteria regarding its sustainability and transparency (see section 1.1.2.3 and appendix B) have to be more selective.

e-MFP (2013) states, that “considering only size is not enough” (p. 1) when evaluating relative institutional maturity. Further, it reads that “all three dimensions are equally important” (p. 1). On the first view, this speaks for the second proposed interpretation of the results above, namely that the framework does not function in the way intended by its initiators. In the following it is explained why these statements are not necessarily contradicting the results from above and the framework can be used for the purpose of this thesis.

Firstly, by specifically mentioning that there are other important criteria to an institution’s maturity than its size, it is acknowledged that this is often disregarded in practice. E.g. Spaggiari (2016) and Symbiotics (2016) define tiers only by an institution’s size (interestingly, setting the threshold for tier 1 institutions at assets under management of USD 30 and 100 million, respectively). If size is often used as the only criteria for tier classifications, it can be expected that it is perceived to be the most important one. The above comment just states that size should not be the only dimension to look at.

The claim that all three dimensions need to be of equal importance does not equate to saying that all dimensions need to have the same influence on the results. It just means, that compliance at all dimensions is required to graduate to a higher tier. If the majority of institutions are too small to be considered fully mature, even if they are as sustainable and transparent as their tier 1 counterparts, then the result described above is the logical consequence. This does not call into question the adequacy of the framework.

It is concluded that the dominance of the size dimension in determining the tier of an institution does not necessarily mean that the framework by e-MFP (2013) and MicroRate

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(2013) is flawed. Thus interpretation 1 is to be preferred over interpretation 2, unless evidence against the adequacy of the framework is provided.

Though, if the framework is supposed to become an industry standard, as is the objective stated in e-MFP (2013) as well as in MicroRate (2013), more rigorous studies are needed to evaluate whether it accurately measures institutional maturity.

2.1.2.4 Other possible issues using the multidimensional tiered framework

Independent of the results above, it could also be argued that the present framework is not using the term institutional maturity in the same way as it is defined in this thesis. In this case, the framework is not measuring what is of interest to this study and thus another way of measuring institutional maturity needs to be found.

e-MFP (2013) states that the tiers are expected to be a measure of “relative maturity” (p. 1), without providing a definition of institutional maturity. “Maturity” is defined as “fullness of development”(Oxford English Dictionary, n.d.). Thus “institutional maturity” refers to “fullness of institutional development”. As shown in section 1.1.2.1, institutional development can be defined in many different ways.

In section 1.2.4, institutional maturity of MFIs has been said to refer to an MFI’s ability to sustainably create a social and a financial return. The *e-MFP Action Group of Investors in Tier 2 and 3 MFIs*, which is the author of the framework, is composed of social and socially responsible investors (e-MFP, 2012). Tulchin (2003) indicates, that socially responsible investors are valuing an institutions double bottom line. It can therefore be assumed, that the initiators of the framework expect a mature institution to be able to sustainably create a financial and social return and hence that the determined tiers actually measure what this thesis is concerned with.

The term “relative” in “relative institutional maturity” can be neglected. It refers to the fact that the different tiers are intended to differentiate between *more* and *less* mature MFIs and not to make a statement about the overall maturity of the industry. Since this thesis is only concerned with the differences between MFIs and not with the maturity of the industry, this is of no concern.

2.1.2.5 Consequence

For the listed reasons, the tiered framework suggested by e-MFP (2013) and MicroRate (2013) is taken to be an adequate measure for institutional maturity. The results from section 2.1.2.2 are interpreted as suggested in interpretation 1 in section 2.1.2.3.

Size seems to be the most important dimension to become a tier 1 institution. Put differently, size is the main determinant for an institution’s level of maturity. For the further analysis of

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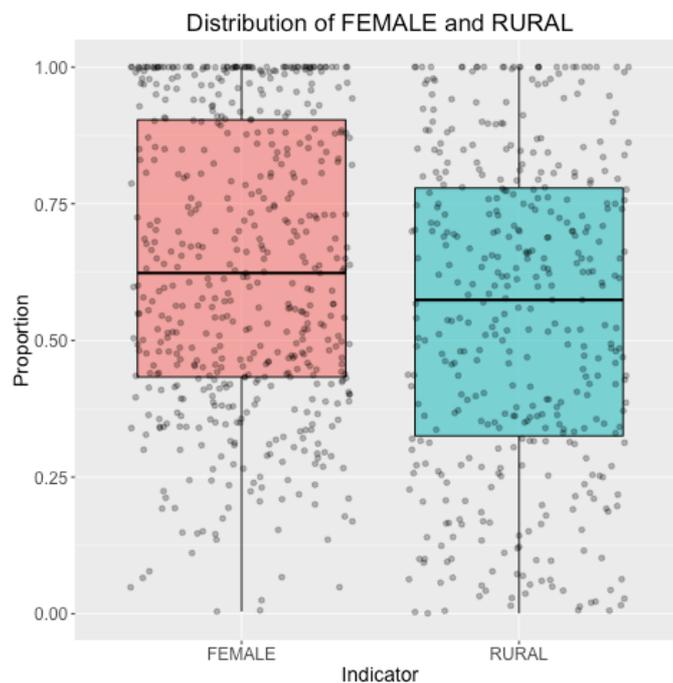
this thesis, this signifies that, *if* hypothesis 2 is true and size is negatively correlated to depth of outreach, it is probable that also hypothesis 1 holds and depth of outreach shallows in institutional maturity (section 1.3.2).

2.1.3 Depth of Outreach

This thesis analyzes the proportion of female borrowers (FEMALE) and the proportion of rural borrowers (RURAL) of MFIs. In section 1.1.3.1 the variable choice is explained in detail. The decision is based on the literature analysis of different measures for depth of outreach in section 1.2.3.2. This section gives an overview of how FEMALE and RURAL are distributed in the data.

FEMALE is taken directly from the dataset as reported by the MFI. RURAL was determined by dividing the number of female borrowers by the sum of female and male borrowers. Legal entities are excluded.

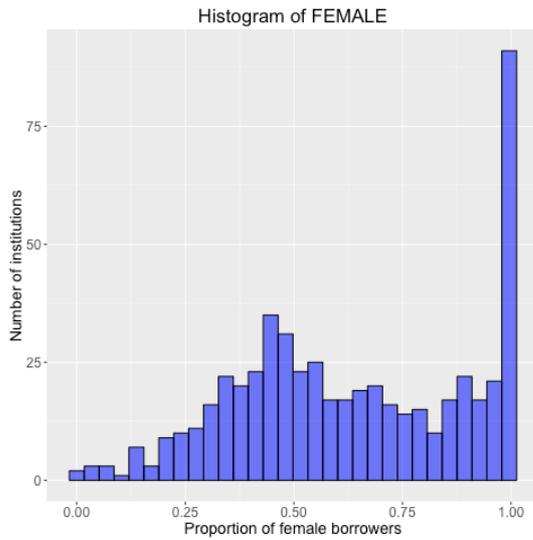
Figure 6: Distribution of FEMALE and RURAL



Source: Own graphic, based on MIX data

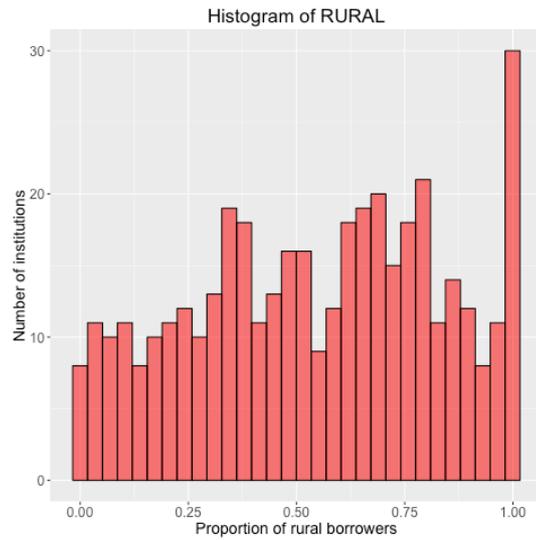
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Figure 7: Histogram of FEMALE



Source: Own graphic, based on MIX data

Figure 8: Histogram of RURAL



Source: Own graphic, based on MIX data

Table 4: Distribution of FEMALE and RURAL in all MFIs

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	Obs
FEMALE	0.4 %	43.3 %	62.3 %	63.9 %	90.3 %	100 %	540
RURAL	0.1 %	32.5 %	57.4 %	54.8 %	77.9 %	100 %	415

Source: MIX

Table 5: Distribution of FEMALE and RURAL in non-focused MFIs

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	Obs
FEMALE	0.4 %	36.4 %	47.7 %	47.8 %	61.1 %	80 %	354
RURAL	0.1 %	25.7 %	45.8 %	43.9 %	65 %	79.7 %	321

Source: MIX

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Figure 6-8 and table 4 and 5 show the distribution FEMALE and RURAL among the 540 and 415 MFIs which reported on gender and location of their borrowers. Each dot in figure 6 stand for one observation in the sample.

The most striking observation is, that there are many MFIs exclusively focused on female and rural borrowers, respectively. Conversely, there are very few with a strong focus on male or urban borrowers. More concretely, 186 institutions have a strong focus on women and 94 MFIs are strongly focused on rural regions. For this study, a strong focus has been defined as 80% or more of the borrowers being female or rural, respectively. Including the strongly focused institutions, the mean and the median are around 60% for both indicators. One quarter of institutions report a value for FEMALE of 90.3% or more. The third quartile of RURAL is at 77.9%, which is lower but still high. Taken aside institutions with a strong focus on rural or female borrowers, the means as well as medians of both indicators dip below 50%. Figure 7 suggests, that FEMALE in non-focused institutions is approximately normally distributed, with its mode slightly below 50%. Looking at figure 8, it can be seen that RURAL in non-focused institutions resembles a uniform distribution with some hardly interpretable peaks. Table 5 confirms this. On the one hand, the mean and the median lie very close to each other at both distributions, which is a characteristic of both the uniform and the normal distribution. On the other hand, the interquartile range in the distribution of RURAL in non-focused institutions is much wider than the one of other distribution.

In short: The mean and median of the distribution of FEMALE and RURAL are around 60%, suggesting that microfinance institutions in general have a slight preference for those groups of borrowers. There are many institutions with a strong focus on female or rural borrowers. It is mainly due to their influence, that the averages of the distributions are above 50%. If the institutions with a strong focus are excluded, the median as well as the mean of both distributions are below 50%.

It can thus be concluded that there is a group of institutions dedicated to serving women and rural areas. Apart from this group, there does not seem to be evidence for a preference of those groups. The model developed in section 1.3.2 and visualized in figure 3 gives a possible explication for these distributions.

It has to be added, that in the markets, where MFIs are active, there is usually a strong bias towards men and urban areas (United Nations, 2006). The fact that female and rural borrowers do not make up a majority of the total borrowers does not mean that the institutions are not targeting these groups more than is usual in the environment they operate in.

2.1.4 Region and Interaction Between Depth of Outreach and Institutional Maturity

Bolli & Vo Thi (2014) have found that the influence of production processes on social outputs of MFIs varies greatly from region to region. The explorative analysis below shows, that the levels of depth of outreach as well as their connection to institutional maturity indeed are very different in different regions.

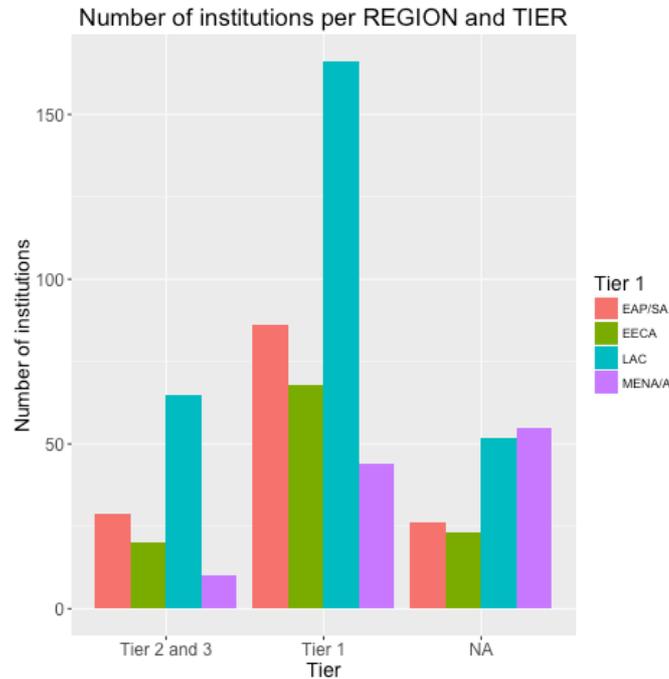
The tests introduced in section 1.3.3.2 have been designed, such as to control for these differences in our analysis. They show for which regions the hypotheses can be accepted and for which it needs to be rejected. This section gives a short overview over the distribution of MFIs across tiers in different regions. It is also explored, how institutional maturity might affect depth of outreach in different regions.

For this study, the regions are defined as East Asia, South Asia and the Pacific (EAP/SA), Eastern Europe and Central Asia (EECA), Latin America and the Caribbean (LAC), and Middle East, North Africa and Africa (MENA/A). The regions Middle East and North Africa (MENA) is usually regarded as separate from Africa (A). Also, East Asia and the Pacific (EAP) is usually not joined with South Asia (SA). Since there are not enough observations, for which all necessary information to test the hypotheses is available, these regions are taken together.

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2.1.4.1 Distribution of tiers in different regions

Figure 9: Number of institutions per region and tier



Source: Own graphic, based on MIX data

Table 6: Number of institutions per region and tier

	Tier 2 and 3	Tier 1	NA
EPA/SA	86 (74.8 %)	29 (25.2 %)	26
EECA	68 (77.3 %)	20 (22.7 %)	23
LAC	166 (71.9 %)	65 (28.1 %)	52
MENA/A	44 (81.5 %)	10 (18.5 %)	55

Source: MIX

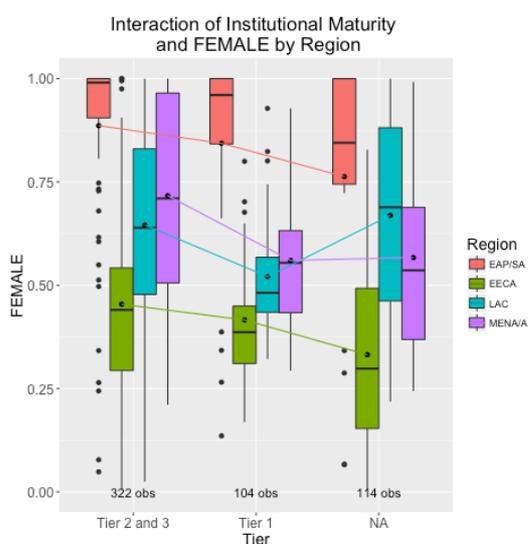
Table 6 and figure 9 show that the number of institutions in the dataset is very unevenly spread across the regions. Among the institutions for which the tier was determined, almost half are from LAC and only about 10% from MENA/A. In MENA/A, the tiers were only

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evaluated for about half of the institutions, while in the other regions more than 80% of the institution reported the data necessary to determine their tier. The proportion of tier 1 institutions is between 18.5% in MENA/A and 28.1% in LAC.

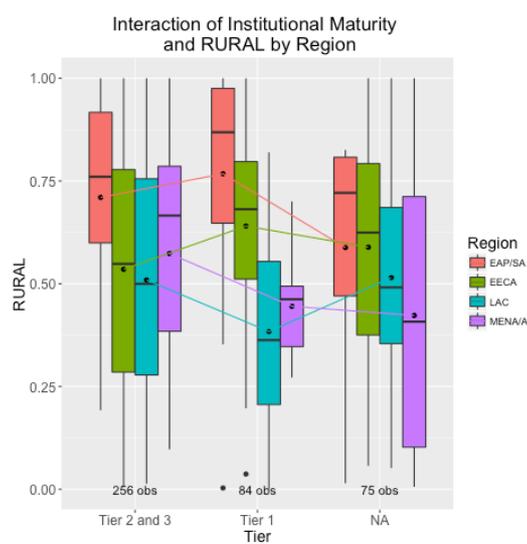
2.1.4.2 Interaction between institutional maturity and depth of outreach in different regions

Figure 10: Interaction of institutional maturity and FEMALE by region



Source: Own graphic, based on MIX data

Figure 11: Interaction of institutional maturity and RURAL by region



Source: Own graphic, based on MIX data

Figure 10 depicts the interaction of institutional maturity (x-axis) and the proportion of female borrowers (y-axis) for each region. Here, the regions mostly differ in the *level* of depth of outreach. In EAP/SA, a large part of the institutions are strongly focused on female borrowers, leading to an average proportion of female borrowers of more than 75% in all groups. LAC and MENA/A both have an average proportion of female borrowers of between 50% and 75%. Only in EECA, the average proportion of female borrowers is below 50%.

In all regions, the proportion of female borrowers is lower in tier 1 institutions than in tier 2 and 3 MFIs. The MFIs, for which the tier could not be determined, have a lower proportion of female borrowers in EECA and EAP/SA, and a higher one in LAC. In general, the distribution of the proportion of female borrowers among institutions with no tier assigned is not notably different from the distribution in MFIs, for which the tier was determined. Thus there is no reason to believe that a major bias is introduced by excluding them.

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Figure 11 depicts the interaction of institutional maturity (x-axis) and the proportion of rural borrowers (y-axis) for each region. The level of the proportion of rural borrowers is much more homogenous between the regions than the level or the proportion of female borrowers. Again, EAP/SA shows the highest level of depth of outreach, with an average proportion of rural borrowers above 70% for institutions at all levels of institutional maturity (with the notable exception of those institutions, for which the tier was not evaluated). MFIs from LAC have the lowest average proportion of rural borrowers (below 50% for all groups).

The notable observation is that the relationship between institutional maturity and the proportion of rural borrowers is different in different regions. Tier 1 institutions from EAP/SA and EECA have a higher expected proportion than the tier 2 and 3 MFIs from the same region. These regions are also the ones at a higher average proportion of rural borrowers in general. In LAC and MENA/A, where the proportion of rural borrowers is generally lower, tier 1 institutions have a lower average proportion of rural borrowers than tier 2 and 3 institutions.

The proportion of rural borrowers in institutions where the tier was not determined is lower in EAP/SA and MENA/A, higher in LAC, and about the same in EECA. Yet again, the differences in the distribution of institutions not assigned to a tier do not seem too large to be worried about introducing a major bias by excluding them from the analysis below.

2.1.5 Sample Selection

Those institutions, from which it is not known whether they manage specialized microfinance portfolios, have already been excluded. This left us with a sample of 644 institutions in 2013. From the remaining institutions, those which provide all the necessary information to test our hypothesis are selected. The following parameters are necessary and sufficient to include them in our analysis:

- 1 Level of institutional maturity (tier)
- 2 Proportion of female borrowers (FEMALE)
- 3 Proportion of rural borrowers (RURAL)
- 4 Region (known for all observations for which tiers are evaluated)

Of the original 644 institutions, 156 have to be excluded because their level of institutional maturity (tier) could not be determined. This was mostly due to missing data on their ROA (section 2.1.2.1). 104 did not report their proportion of female borrowers, and 229 did not

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report on the proportion of rural borrowers. This leaves 333 MFIs which have reported all data needed for the tests below.

In appendix C.2, there are plots comparing the distribution of the variables of interest of the 333 MFIs included in the sample with the one of the 311 excluded MFIs. The distribution of tiers, AUM, ROA, FEMALE and RURAL all seem to be very similar in included and excluded institutions. Only the regional distribution has shifted remarkably: Institutions from MENA/A make up 26.7% of the excluded institutions, but only 7.8% (26 institutions) from the sample. On the other extreme, the excluded institutions contain only 10% institutions from EECA, while they make up 24% of the included institutions (table 12 in appendix C.2.2). This is another hint that it is necessary to look at the regions individually, since their weight in the sample is misrepresented.

2.2 Empirical Results

In this section the results of the empirical analysis of this study are presented and discussed. Section 2.2.1 treats the results concerning the effect of institutional maturity on the probability, that an institution has a strong focus on female and rural borrowers. It is also analyzed, whether the results can be attributed to an institutions size rather than its sustainability. Section 2.2.2 then looks at the relationship between institutional maturity and the proportion of female or rural borrowers, given that the institution is not strongly focused on those groups. Again, it is studied whether this effect can be attributed to an institution's size or sustainability.

Since the explorative data analysis in section 2.1.4.2 has shown that the relationship between institutional maturity and the proportion of female and rural borrowers is very different in different regions, separate models are fitted for each region (EAP/SA, EECA, LAC, MENA/A).

For the sake of completeness, the results of the tests of all models are described in section 2.2.1 and 2.2.2. The discussions and plots in this section are based on the results in appendix B (tables 13 – 24). Section 2.2.3 summarizes all the statistically significant results and gives a possible interpretation for each region.

2.2.1 Determinants for the Proportions of Institutions with Strong Focus (Test 1.1 – 1.3)

In section 1.3.2 it was stated, that tier 1 Institutions are expected to be less likely to have a strong focus on female and rural borrowers (hypothesis 1). As institutions grow in size, they are expected to start providing a larger palette of services and work with a more diverse clientele and geographical locations. The expected consequences are, that the increase in size, which leads to an increase in institutional maturity, leads to tier 1 institutions being less likely to have a strong focus on female or rural borrowers.

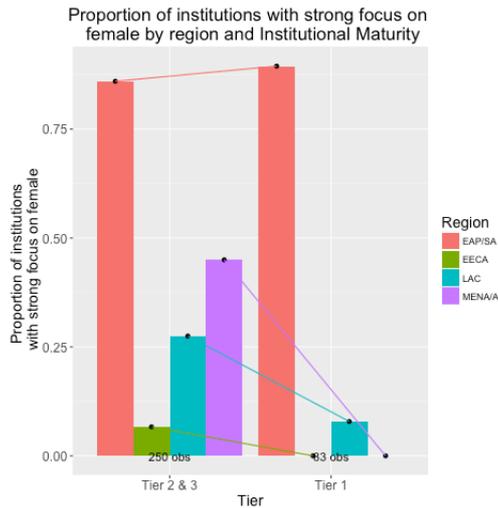
An institution is defined to have a strong focus on one of these groups if it makes up more than 80% of total borrowers. The dummy variables FOCUSFEMALE and FOCUSRURAL are introduced to indicate whether or not an institution is strongly focused on female or rural borrowers, respectively. On an aggregate level, the expected values of FOCUSFEMALE and FOCUSRURAL are to be interpreted as the probability that an institution of a given group is strongly focused on female or rural borrowers. In the following it is tested whether the proportion of institutions with a focus on female or rural borrowers is significantly different among Tier 1 institutions than it is for tier 2 & 3 MFIs and whether this difference comes from an institution's increase in size.

The analysis is split up in three parts: First, the difference in proportions of institutions with strong focus on female and rural borrowers from tier 1 institutions to tier 2 and 3 institutions is analyzed. Second, a logistic regression is fitted to analyze the effect of being tier 1 compliant at each dimension of institutional maturity. Lastly, with another logistic regression, the influence of size and sustainability on the probability of being strongly focused is studied. Detailed results are in the appendix D.1 (tables 13 – 18).

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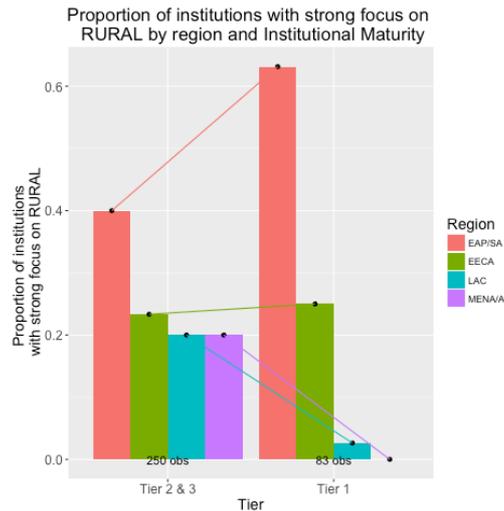
2.2.1.1 Effects of institutional maturity on FOCUSFEMALE and FOCUSRURAL (test 1.1, appendix D.1.1)

Figure 12: FOCUSFEMALE by region and institutional maturity (test 1.1.1)



Source: Own graphic, based on MIX data

Figure 13: FOCUSRURAL by region and institutional maturity (test 1.1.2)



Source: Own graphic, based on MIX data

Figure 12 and figure 13 show the proportions of institutions which are focused on female and rural borrowers. For each region, the proportion is calculated for tier 2 and 3 institutions and compared to the proportion among tier 1 institutions. The lines connecting the bars illustrate the different tendencies in the different regions. A positive slope suggests that tier 1 institutions are more likely to have a strong focus on the respective groups of borrowers and thus contradicts the hypothesis 1. A negative slope indicates a smaller proportion of strongly focused MFIs among tier 1 institutions. Negative slopes support the expectation that the proportion of institutions with strong focus decreases in institutional maturity. The slopes can only be interpreted relative to each other. No absolute interpretation of the slope is possible, since the run is arbitrary. Both plots show very different dynamics for different regions.

FOCUSFEMALE (table 13 in appendix D.1.1)

Test 1.1.1:

$$FOCUSFEMALE_{tier1} < FOCUSFEMALE_{tier2\&3}$$

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For institutions from EAP/SA, the proportion of institutions with strong focus on female borrowers is very high for tier 2 and 3 institutions (86%) and even higher for tier 1 MFIs (to 89.5%). Institutions from EECA are very unlikely to have a strong focus on female borrowers. The proportion on of institutions with strong focus on female clients does not seem to be related to institutional maturity (6.7% in tier 2 and 3 and 0% in tier 1). Only institutions from LAC and MENA/A show the expected behavior. They have a higher proportion of institutions focusing on female borrowers among less mature institutions (27.5% and 45%) than among tier 1 institutions (7.9% and 0%).

A Fisher Exact test of difference in proportions (Agresti, 2013) shows that the difference of proportions of institutions with strong focus on female borrowers is only significant on the 5% significance level for institutions from LAC. In the sample of 120 tier 2 and 3 and 38 tier 1 institutions from LAC, there is a 19.6% drop in the proportion of institutions with a strong focus on female borrowers from tier 2 and 3 to tier 1 institutions.

FOCUSRURAL (table 14 in appendix D.1.1)

Test 1.1.2:

$$FOCUSRURAL_{tier1} < FOCUSRURAL_{tier2\&3}$$

Institutions from EAP/SA are also the most probable to be strongly focused rural borrowers. Again, this proportion is higher among tier 1 institutions (63.2%) than among tier 2 and 3 institutions (40%). In EECA the proportion is similar for both groups of institutional maturity (23.3% and 25%). In LAC and MENA/A the expected decrease in institutional maturity is again observed (from 20% to 2.6% in LAC and from 20% to 0% in MENA/A).

Like above, the decrease is only significant in LAC, with a drop of 17.4% in the proportion of strongly focused institutions from tier 2 and 3 to tier 1 institutions..

Summary

It is concluded that the proportion of institutions with strong focus on female borrowers and institutions with strong focus on rural borrowers decreases in institutional maturity in LAC. For other regions, no significant difference has been found. The data suggests similar dynamics in MENA/A. In EECA there seems to be absolutely no influence on the proportion of strongly focused institutions. Interestingly, institutions from EAP/SA might be more likely to be strongly focused if they are more mature. Larger sample sizes are needed to verify these trends.

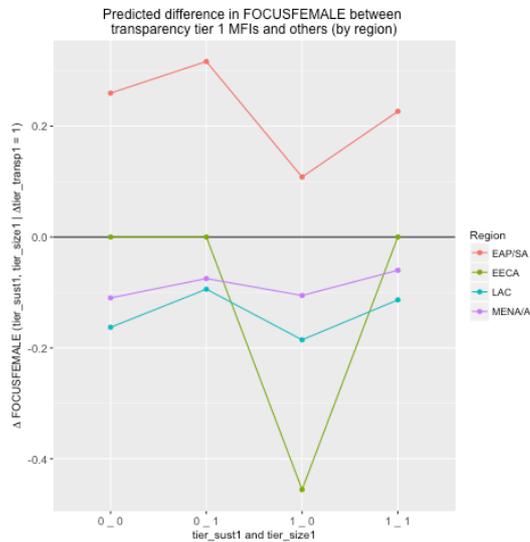
2.2.1.2 The effect of the level of tier compliance in size, sustainability and transparency on FOCUSFEMALE and FOCUSRURAL (test 1.2, appendix D.1.2)

In a further step, the effect of tier 1 compliance at each separate dimension on the proportion of institutions with strong focus on female and rural borrowers is studied. Logistic regressions are fitted to evaluate the claim that those proportions are affected by the compliance-level in size, but not sustainability and transparency (hypothesis 2). FOCUSFEMALE and FOCUSRURAL are the dependent variables in the model. They indicate whether or not an institution is strongly focused on female or rural borrowers ($FEMALE > 0.8$ or $RURAL > 0.8$) for individual institutions. To test the hypothesis, the interest lies on the variables on an aggregate level (i.e. the value of FOCUSFEMALE and FOCUSRURAL for regions), where they represent the proportion of strongly focused institutions. The independent variables are dummies for whether or not an institution complies with tier 1 criteria at each of the dimensions (tier_sust1, tier_size1 and tier_transp1).

Contrary to the expectations, being tier 1 compliant at the size dimension ($AuM > \$50'000'000$) does not significantly to change FOCUSFEMALE or FOCUSRURAL in any region, but tier 1 compliance at the transparency dimension does in some. Figure 14 and 15 below illustrate the expected difference in FOCUSFEMALE and FORUSRURAL between transparency-tier 1 compliant institutions and others. The impact of being transparency-tier 1 compliant also depends on the tier compliance at the other dimensions, which are indicated on the x-axis (0 if they fail to comply and 1 if they comply at the given dimension). Points below zero indicate, that the proportion of female and rural borrowers is lower in transparency-tier 1 compliant institutions than in less transparent institutions in the same region.

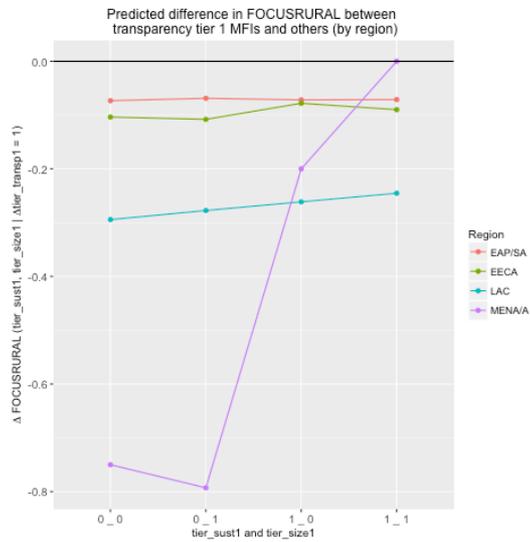
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Figure 14: Difference in FOCUSFEMALE between transparency-tier 1 MFIs and others (by region)



Source: Own graphic, based on MIX data

Figure 15: Difference in FOCUSRURAL between transparency-tier 1 MFIs and others (by region)



Source: Own graphic, based on MIX data

FOCUSFEMALE (table 15 in appendix D.1.2)

Model 1.2.1:

$$\text{logit}(\text{FOCUSFEMALE}) = \beta_0 + \beta_1 * \text{tier_sust1} + \beta_2 * \text{tier_size1} + \beta_3 * \text{tier_transp1}$$

There is a significant reduction in the proportion of institutions strongly focused on female borrowers for transparency-tier 1 compliant institutions in both EECA and LAC (green and blue in figure 14). The results for EECA is not interpreted, since there are only six institutions which do not comply with tier 1 criteria according to their transparency in this region and only four in are strongly focused on female borrowers. Thus the predicted proportion of institution with strong focus on female borrowers is very unreliable. There is only a difference between transparent and less transparent institutions if the institution is tier 1 compliant in sustainability but not in size. Since there is no intuitive explanation for this and the sample size for not transparency-tier 1 compliant institutions is too small to get reliable results, this case is not discussed any further.

In LAC, institutions who are transparency-tier 1 compliant are predicted to be between 9.4 and 18.5 percentage points less likely to be strongly focused on female borrowers. The proportion decreases for all combinations of levels of compliance in sustainability and size,

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i.e. all values for LAC in figure 14 are below zero. The sample sizes are sufficiently, consisting of more than 10 observations for each combination of tier_transp1 and FOCUSFEMALE. Thus these results are likely to accurately represent the population of institutions from LAC.

FOCUSRURAL (table 16 in appendix D.1.2)

Model 1.2.2.:

$$\text{logit}(\text{FOCUSRURAL}) = \beta_0 + \beta_1 * \text{tier_sust1} + \beta_2 * \text{tier_size1} + \beta_3 * \text{tier_transp1}$$

For the proportion of institutions with strong focus on rural borrowers, the reduction in transparency-tier 1 compliant institutions from LAC is significant even at the 1% level (blue in figure 15). The expected difference in the probability of having a strong focus on rural borrowers lies between 24.5 and 29.4 percentage points, depending on the levels of compliance at the other dimensions. Again, a reduction is predicted for all combinations of tier 1 compliance at the sustainability and size dimensions. Note that there is no interaction term included in the model, but by the nature of the logistic regression, the expected effect of a marginal increase in the variable of interest is not constant. It is thus indirectly affected by all variables in the model (Faraway, 2016).

Summary

In LAC, the results contradict hypothesis 1, namely that the decrease in strongly focused institutions in institutional maturity is attributed to an institutions size. There is no evidence that large institutions are less likely to have a strong focus rural or female borrowers. Instead, MFIs which are tier one compliant according to their transparency are less likely to have a strong focus on those groups. There might also be some interactions between the tier 1 compliance at the different dimensions, which could have an influence on the proportion of strongly focused institutions. For this thesis, interaction terms were omitted due to a lack of observations to fit such a large model.

2.2.1.3 The effect of size and sustainability on the FOCUSFEMALE and FOCUSRURAL (test 1.3, appendix D.1.3)

The thresholds for the levels of compliance at the dimensions of institutional maturity are just one possibility to classify MFIs. To get a more general impression of the influence of an institutions size and sustainability on the likelihood of being strongly focused on female or rural borrowers, the last part of the analysis looks at the two dimensions on a continuous scale and controls for their interaction. The dummy variable for tier 1 compliance at the

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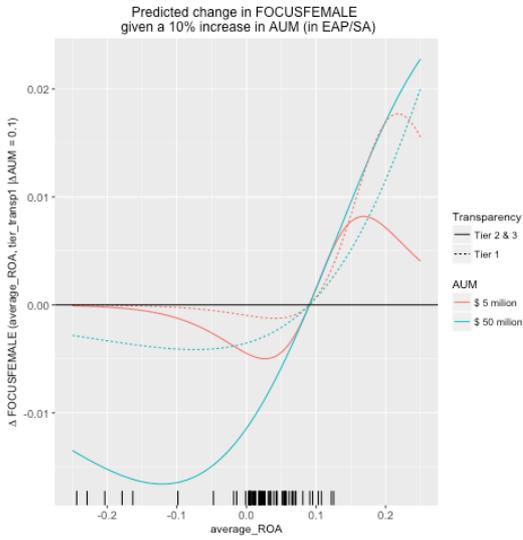
transparency dimension is also added to the model, since it has been shown to be a significant factor in some regions.

Using a multiple logistic regression model, the influence of an institutions size and sustainability on the probability of being strongly focused on female and rural borrowers is modeled. AUM is taken as a proxy of an institution's size. An institution's sustainability is measured as its average ROA over the past three years (Average_ROA). The proxies for size and sustainability are intentionally chosen such as to be similar to the definitions in the tiered framework used to determine institutional maturity. Again, separate models are fitted for each of the four regions.

This analysis is not concerned with extremely small or unsustainable institutions. Yet, on a continuous scale, such observations have an enormous influence on the predicted proportions. To get a more accurate picture of the effects of interest, two institutions with an Average ROA of less than -24% were removed. Both removed institutions are from EAP/SA.

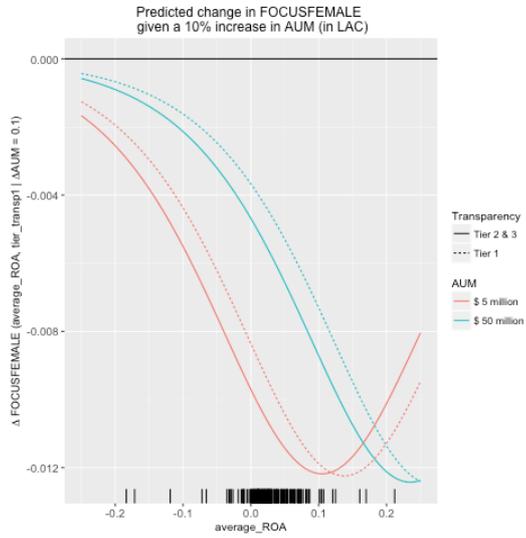
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Figure 16: Expected change in FOCUS-FEMALE given a 10% increase in AUM (in EAP/SA)



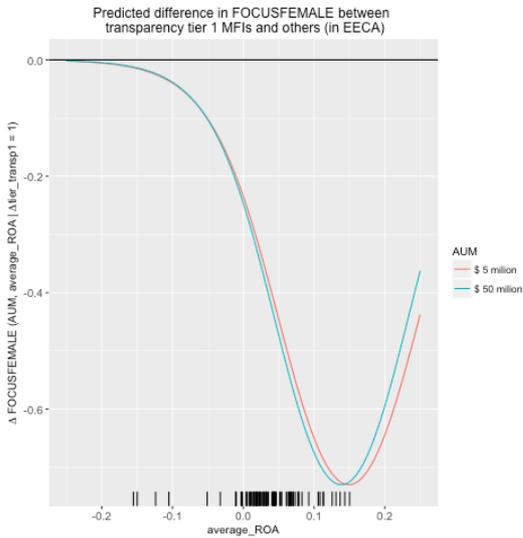
Source: Own graphic, based on MIX data

Figure 17: Expected change in FOCUS-FEMALE given a 10% increase in AUM (in LAC)



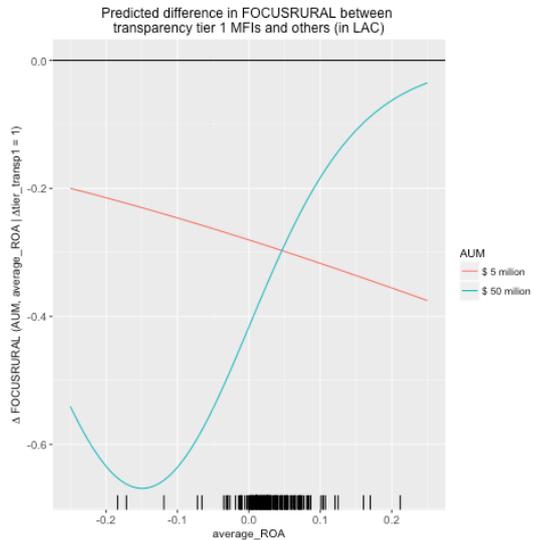
Source: Own graphic, based on MIX data

Figure 18: Expected difference in FOCUSFEMALE between transparency-tier 1 MFIs and others (in EECA)



Source: Own graphic, based on MIX data

Figure 19: Expected difference in FOCUSRURAL between transparency-tier 1 MFIs and others (in LAC)



Source: Own graphic, based on MIX data

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The results are very inconclusive. Figures 16 to 19 visualize the significant results from the test by showing how much the response variable changes in response to a change in the significant explanatory variable. In a multiple logistic regression with interaction terms, the size and direction of the effect depends on the levels of the other variables in the model as well as on the base level of the explanatory variable of interest.

FOCUSFEMALE (table 17 in appendix D.1.3)

Model 1.3.1:

$$\text{logit}(\text{FOCUSFEMALE}) = \beta_0 + \beta_1 * \log(\text{AUM}) + \beta_2 * \text{Average_ROA} + \beta_3 * \text{tier_transp1} + \beta_4 * \log(\text{AUM}) : \text{Average_ROA}$$

The only regions, where the effect of size on the proportion of institutions with strong focus on female borrowers is significant at the 5% level, are LAC and EAP/SA. Figure 16 and 17 show the predicted decrease in the probability of being strongly focused on female borrowers if assets under management increase by 10%.

In EAP/SA (figure 16) this effect very much depends on an institutions initial sustainability, size and whether or not it is transparency-tier 1 compliant. But of all these effects, only size was significant on a 5 % level. So for institutions in EAP/SA, the predicted probability of being strongly focused on female borrowers decreases in size. In this sample, the effect is more pronounced for institutions with an average ROA around 0. For very profitable institutions (Average ROA > 0.09), the effect is reversed. Yet, data is scarce at the tails and extrapolation is problematic. It is thus concluded that in EAP/SA, there seems to be a negative relationship between the size of an institution and the probability that it is strongly focused on female borrowers for most institutions. This might not hold if an institution is extremely profitable. It also needs to be mentioned that only 8 institutions in this region are not strongly focused on female borrowers. The results are therefore very unreliable.

The effect in LAC (figure 17) suggests a clearer interpretation. An increase in size decreases the probability that an institution is strongly focused on female borrowers at any size, sustainability and transparency level. In the most densely populated parts of the distribution, this negative effect is stronger for more profitable institutions smaller institutions. Whether or not an institution complies with transparency-tier 1 criteria is of minor importance for the impact of an increase in size on the likelihood of being strongly focused on female borrowers. In both EAP/SA and LAC, the predicted decrease in the probability of being strongly focused is in most cases below 1 percentage points for a 10% increase in AUM. Assuming the proportion of female borrowers decreases by 1 percentage point for every 10% increase in assets under management, an institution could double in size while only decreasing the

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proportion of female borrowers by 7 percentage points. In this scenario, growth would still lead to a large increase in outreach to female borrowers.

In EECA (figure 18), being transparency-tier 1 compliant largely decreases the probability of being strongly focused on female borrowers. This decrease is more pronounced for more sustainable institutions. Again, sample size is an issue in interpreting these results: Only 4 Institutions from EECA are strongly focused on female borrowers and only 6 do not comply with transparency-tier 1 criteria. Also this result is considered too unreliable to be discussed in more detail.

FOCUSRURAL (table 18 in appendix D.1.3)

Model 1.3.1:

$$\text{logit}(\text{FOCUSRURAL}) = \beta_0 + \beta_1 * \log(\text{AUM}) + \beta_2 * \text{average_ROA} + \beta_3 * \text{tier_transp1} + \beta_4 * \log(\text{AUM}) : \text{average_ROA}$$

When it comes to the influence on the probability, with which an institution is strongly focused on rural borrowers, the only significant effect is found in LAC. Transparency-tier 1 compliant MFIs are less likely to be strongly focused on rural borrowers than less transparent institutions. The effects of size and sustainability are not significant. In the sample, the magnitude of the effect of being transparency-tier 1 compliant on FOCUSRURAL decreases in sustainability for large institutions while it slightly increases for small institutions.

Summary

Globally, hypothesis 2 cannot be confirmed. At the 5% significance level, the effect of an MFI's size on the probability that is strongly focused on female borrowers was only significant for institutions from LAC. In other regions, the relationship between size, sustainability and the likelihood to have a strong focus on female and rural borrowers looks very different. The result from the analysis before, namely that transparency has a negative influence on the proportions of interest, is confirmed for the probability of being strongly focused on rural borrowers in LAC. The significant, but minor effects in EECA and EAP/SA are discarded due to the small sample sizes.

2.2.2 Depth of Outreach in Non-Focused Institutions (Tests 2.1 – 2.3)

In section 2.2.1, it was discussed whether or not institutional maturity has an influence on the probability of being strongly focused on female and rural borrowers. This was shown to be the case in LAC, while no evidence for or against it was found in other regions. On a global level, it could not be determined whether one specific dimension of institutional maturity is

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responsible for the effect, while in LAC transparency seems to be the dimension driving the effect.

The interest of section 2.2.2 lies in institutions which are not strongly focused on female or rural borrowers. Thus the proportion of female borrowers is analyzed only for institutions, where less than 80% of the borrowers are female. Similarly, the proportion of rural borrowers is analyzed in institutions with less than 80% of borrowers in rural areas.

According to the hypothesis 1, mature institutions have a lower proportion of female and rural borrowers, since they give up exclusive focus on those two groups. They are thus less likely to have more than 80% of the borrowers from one of those groups and thus be defined as strongly focused institutions. This is assumed to be the case because, as MFIs grow in size, they will enter new markets and thus open up to a more diverse set of clients hypothesis 2.

This reasoning does not suggest, that institutions which are not strongly focused on female or rural borrowers have less borrowers from those groups. It is thus expected, that there is no difference in the distribution of the proportion of female and rural borrowers borrowers tier 1 institutions and tier 2 or 3 MFIs (hypothesis 3). This argument is elaborated in more detail in section 1.3.2 and illustrated in figure 3.

Again, the analysis is split in three sections: First, it is tested whether the distribution of the proportions of female and rural borrowers is different among tier 1 MFIs than among less mature institutions. Second, the effect of being tier 1 compliant at each individual dimension on the proportion of female and rural borrowers is measured. Third, the effects of size and sustainability on a continuous scale are studied. The results of the analysis are to be found in the appendix D.2.

2.2.2.1 Effects of institutional maturity on FEMALE and RURAL in non-focused institutions (test 2.1, appendix D.2.1)

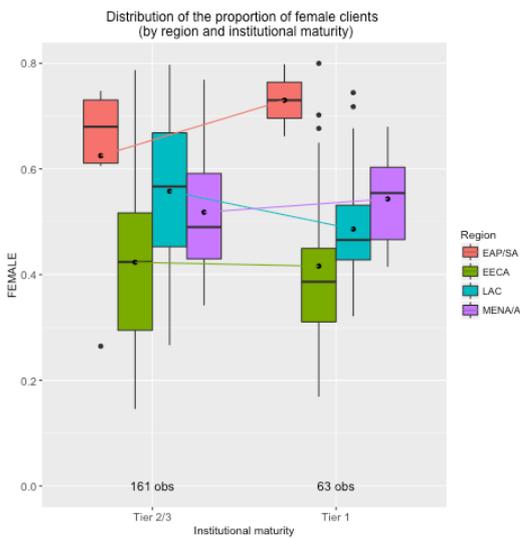
The first model assesses the average proportion of female and rural borrowers among tier 1 MFIs and less mature institutions. It is expected, that there is no significant difference in the proportions between different levels of institutional maturity.

The significance of the difference in means of the proportion of female borrowers is determined using a t-test, since the percentage of female borrowers in non-focused institutions is approximately normally distributed (see figure 30 in appendix D.2.1). The significance of the difference in means of the proportion of rural borrowers cannot be evaluated using a t-test, since the percentage of rural borrowers does not follow a Gaussian distribution (figure 31 in appendix D.2.1). Thus a rank-based Wilcoxon-test is used, which does not assume any

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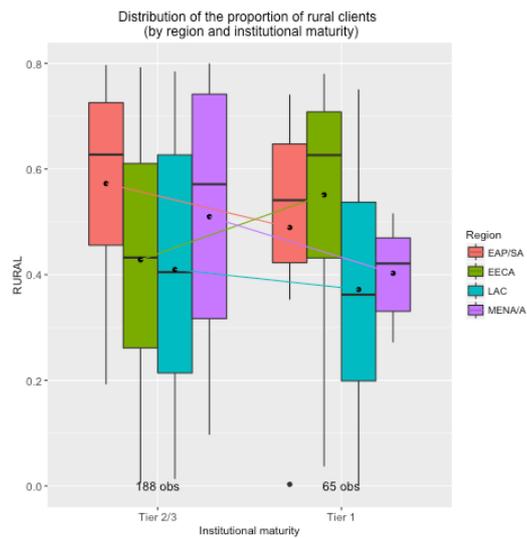
specific distribution of the underlying data. The Wilcoxon-test is much less likely to show a significant result than the t-test (Hollander et al., 2013).

Figure 20: Distribution of FEMALE in non-focused institutions (by region and institutional maturity)



Source :Own graphic, based on MIX data

Figure 21: Distribution of RURAL in non-focused institutions (by region and institutional maturity)



Source :Own graphic, based on MIX data

Test 2.1.1

$$FEMALE_{tier1} = FEMALE_{tier2\&3}$$

Test 2.1.2

$$RURAL_{tier1} = RURAL_{tier2\&3}$$

Figure 20 and 21, based on tables 19 and 20 in appendix D.2.1, show the distribution of the proportion of female and rural borrowers in tier 1 and lower tier institutions for each of the four regions. The lines connect the means of the distributions. A negative slope suggests a lower proportion of female and rural borrowers among tier 1 institutions. In all regions except LAC, the effect on the proportion of female borrowers has the opposite sign than the effect on the proportion of rural borrowers. This suggests that the factors determining outreach to women are different from those determining outreach to rural areas. As above, the slopes cannot be interpreted in absolute terms, but only relative to the other regions.

In contradiction to what was assumed in hypothesis 3), there is a significant decrease in the proportion of female borrowers in LAC (blue boxes and line in figure 20). Non-focused tier 1

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institutions from LAC have on average 7.2 percentage points less female borrowers than non-focused tier 2 or 3 institutions from the same region.

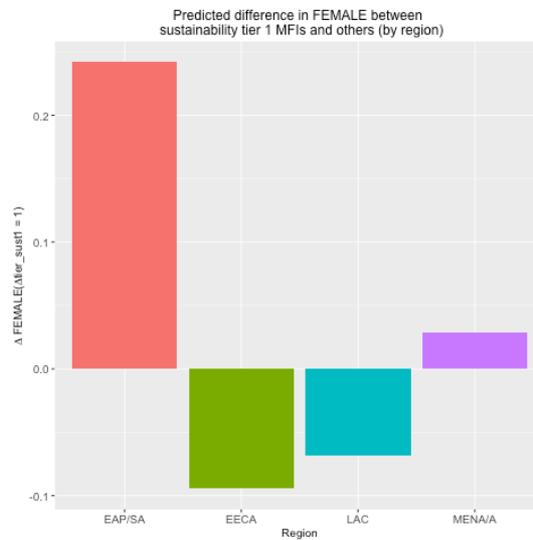
Small sample sizes and the resulting inexact estimates make any other statements impossible. In general, differences in the means of the proportions are mostly quite small. This suggests, that there is no difference in the focus on more vulnerable demographics between tier 1 MFIs and less mature ones.

2.2.2.2 The effect of the level of tier-compliance in size, sustainability and transparency on FEMALE and RURAL in non-focused institutions (test 2.2, appendix D.2.2)

This section analyses the influence of the level of compliance at the different dimensions of institutional maturity on the proportion of female and rural borrowers among non-focused institutions. To test the hypothesis 3, which expects no difference between the groups, a linear regression model is fitted. There are a few points to be considered: First, the number of observations in the sample of institutions from EAP/SA which are not strongly focused on female borrowers is very small ($N = 8$). Thus the results are highly unreliable. Second, most of the F-statistics for the models are insignificant, suggesting that only the model predicting the proportion of female borrowers in LAC and EAP/SA are reasonable to pursue further. Further, the adjusted R-squared for the model in LAC is very low (0.064), leaving room for large omitted variable bias. The results of the regression are listed in table 21 and 21 in appendix D.2.

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Figure 22: Expected difference in FEMALE between sustainability tier 1 MFIs and others (in non-focused institutions)



Source :Own graphic, based on MIX data

Model 2.2.1:

$$FEMALE = \beta_0 + \beta_1 * tier_sust1 + \beta_2 * tier_size1 + \beta_3 * tier_transp1$$

Model 2.2.2:

$$RURAL = \beta_0 + \beta_1 * tier_sust1 + \beta_2 * tier_size1 + \beta_3 * tier_transp1$$

The regression tables from model 2.2.1 and 2.2.2 are in table 21 and 22 in appendix D.2.2. The two significant relations are the effects of sustainability on the proportion of female borrowers in EAP/SA and LAC, which are displayed in figure 22 in red and blue. Due to the small sample size, the effect in EAP/SA is disregarded. The effect in LAC is quite small (6.8 percentage points) and barely significant on a 5% level (p-value of 0.049). The result is thus taken as a hint that there might be a negative effect of being highly sustainable on the proportion of female borrowers in LAC. But the evidence is very weak.

Considering the proportion of rural borrowers, no significant results have emerged from the model.

The insignificant F-statistics of the models for all other regions support our assumption, that there is no influence of an institution's sustainability, size, or transparency on the proportion of female and rural borrowers in non-focused institutions. An exception might be institutions from EAP/SA, which shows some curious behavior, but where there are not enough observations in our dataset to draw any conclusions. There might be some interactions

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between the different effects. Yet, again, the sample sizes are not large enough to fit a model including interaction terms.

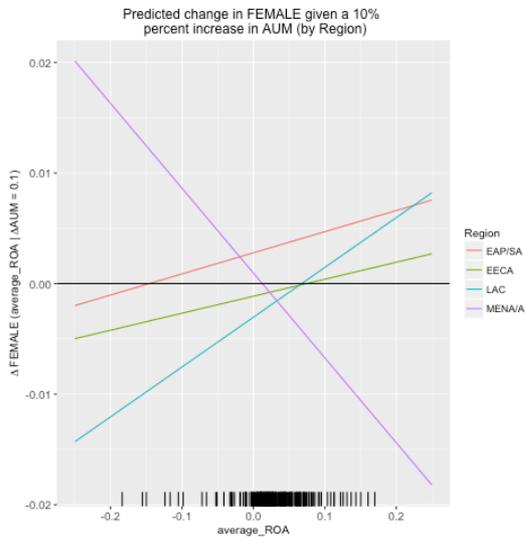
2.2.2.3 The effect of size and sustainability on the FEMALE and RURAL in non-focused institutions (test 2.3, appendix D.2.3)

In section 2.2.2.1, the focus is again on an institutions size and sustainability on a continuous scale. As before, size is referring to the dollar value of an institution's assets under management. To include it in the model, the natural logarithm of AUM was taken. Sustainability is measured by an MFI's average ROA over the past three years (Average_ROA). Using a linear regression model, the influence of the variables on the proportion of female and rural borrowers is estimated for those institutions which do not have a strong focus on those groups ($FEMALE < 0.8$ and $RURAL < 0.8$, respectively). In addition to the an institutions AUM and its average ROA, the model includes an interaction term, controlling for possible interactions between size and sustainability. Contrary to the previous analysis, this model does not include a dummy for transparency, since it does not have a significant effect on the variables of interest (table 21 and 22 in appendix D.2).

The F-statistics are only significant on the 5% level for the models estimating the proportion of female borrowers in EAP/SA and LAC. In EAP/SA, the adjusted R-squared is very high (0.933), but the sample size is very small ($N=8$). For LAC, the model explains only 16.5% of the variance in the proportion of female borrowers (table 23 in appendix D.2). With regard to the percentage of rural borrowers, the F-statistic is only significant for the model for non-focused institutions from EECA. It explains 20.4% of the variance in the proportion (table 24 in appendix D.2).

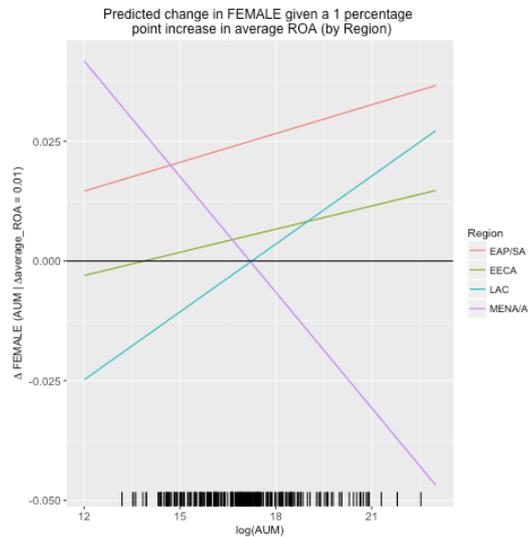
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Figure 23: Expected change in FEMALE given a 10% increase in AUM (in non-focused MFIs)



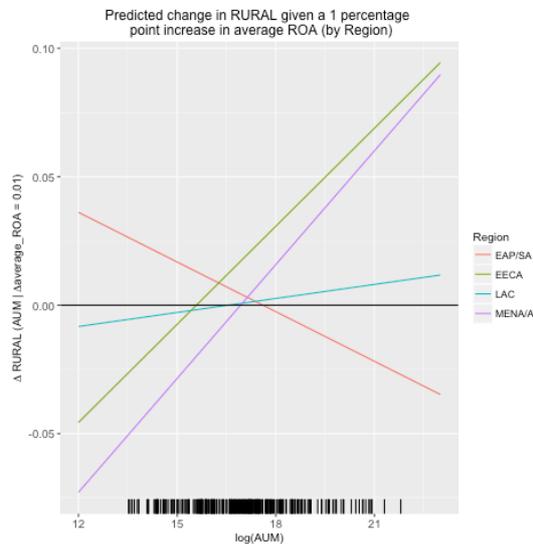
Source: Own graphic, based on MIX data

Figure 24: Expected change in FEMALE given a 1 percentage point increase in ROA (in non-focused MFIs)



Source :Own graphic, based on MIX data

Figure 25: Expected change in RURAL given a 1 percentage point increase in average ROA (in non-focused institutions)



Source :Own graphic, based on MIX data

Figures 23-25 show the expected change in the response variable given a certain change in the significant explanatory variables. Since the estimations are based on liner models, the effect of a change in the explanatory variable does not depend on the base level of the variable itself.

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But, as it is the case for all multiple regressions with interaction terms, the size and direction of the effect depends on the value of the other explanatory variables in the model.

FEMALE (table 23 in appendix D.2.3)

Model 2.3.1:

$$FEMALE = \beta_0 + \beta_1 * \log(AUM) + \beta_2 * Average_ROA + \beta_3 * \log(AUM) : Average_ROA$$

In this sample, the proportion of female borrowers increases in size for institutions from EAP/SA. This effect is significant on the 5% level, but hardly generalizable due to the small number of non-focused institutions from this region (N=8).

For institutions from LAC, both variables have a significant impact on the proportion of female borrowers on the 1% level. The effect of an increase in size on the proportion of female borrowers is negative for unprofitable institutions and positive for profitable institutions (blue line in figure 23). The effect of an increase in profitability is negative for small institutions and positive for large institutions (blue line in figure 24). As can be seen in figures 23 and 24, the effect of an increase in size on the proportion of female borrowers turns positive, once the average ROA is larger than 6%. The estimated effect of an increasing average ROA on the proportion of female borrowers is positive in institutions which manage assets worth more than 25 million dollars. For very large and very sustainable institutions, the proportion of female borrowers is thus expected to increase with a further increase in AUM and ROA. On the other extreme, for very small and very unsustainable institutions, the predicted proportion of female borrowers is smaller if their assets under management or their ROA increases.

Most institutions manage assets worth between 4 and 180 million dollar and have an average ROA of between -5% and 10% (see rug on the bottom of figures 23 and 24). In this range, a 1 percentage point increase in ROA or a 10% increase in AUM changes the estimated proportion of female borrowers by less than 1.25%.

RURAL (table 24 in appendix D.2.3)

Model 2.3.2:

$$RURAL = \beta_0 + \beta_1 * \log(AUM) + \beta_2 * Average_ROA + \beta_3 * \log(AUM) : Average_ROA$$

Finally, for most institutions, there is a significant positive effect of an institution's sustainability on its proportion of rural borrowers in EECA (green line in figure 25). The

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positive relationship between sustainability and outreach to rural borrowers is stronger in larger institutions and reverse for very small institutions.

Summary

Again, the only consistent results have emerged for the region LAC. Combining the results from models 2.2.1 and 2.3.1 it can be said that the sustainability of a non-focused institution has a significant influence on an institutions proportion of female borrowers in this region. The relationship is negative in general, but test 2.3 suggests that it might be reversed for large institutions. The impact of size on the proportion of female borrowers shows very similar behavior. It is negative for most MFIs, but positive for very sustainable institutions. The effect of being size-tier 1 compliant is not significant, but points into the same direction.

For institutions from LAC, this indicates that at an immature state, MFIs decrease outreach to women as they grow larger and more sustainable. But once they are very mature (i.e. large and sustainable), they reverse this trend and start to increase outreach women as they mature further.

In EECA an increase in outreach to rural borrowers might come with an increase in sustainability, as the results from model 2.3.2 suggest. Yet, whether or not an institution is sustainability-tier 1 compliant does not affect the proportion of rural borrowers. Thus this finding is not discussed further.

2.2.3 Summary and Discussion

This section provides a short summary of the results described above. Region by region, significant results and interesting trends are discussed.

2.2.3.1 Middle East, North Africa, and Africa

Despite the joining of the two usually separate regions (MENA and A), the sample size of 26 institutions is too small to generate significant results. With regard to the probability of being strongly focused, institutions from MENA/A seem to follow similar patterns as those from LAC. For non-focused institutions, no obvious trends are visible. A larger sample size is needed for further analysis.

2.2.3.2 East Asia, South Asia, and the Pacific

Also here, two usually separately analyzed regions were joined together, due to too small sample sizes. The joined region is made up of a similar amount of institutions from SA and EAP. Strikingly, the joined region EAP/SA is still the most clearly differentiable of all regions, with a much more distinct focus on female and rural borrowers (figures 10 and 11).

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The vast majority of Asian MFIs are strongly focused on female borrowers (61 out of 69). This can be explained by the strong influence of the Grameen Model in the South Asia Region (Auwal, 1996). Since there are only 8 institutions from EAP/SA which are not strongly focused on female borrowers, the results on the relationship of outreach to women and institutional maturity are very unreliable. With regard to the effects of institutional maturity on the proportion of rural borrowers, no significant results have emerged and no trends are visible.

2.2.3.3 Eastern Europe and Central Asia

There are two very distinct characteristics for institutions from EECA:

First, hardly any institutions are strongly focused on female borrowers (4 out of 80) and, also among non-focused institutions, the proportion of female borrowers is lower than in any other region (figures 12 and 20). Hartarska, Nadolnyak, & McAdams (2013) explain, the MFIs in EECA are mostly serving entrepreneurs. Only very few institutions in this region have a specific poverty target. This could explain the small depth of outreach from institutions in this region.

Second, almost all institutions from EECA are very transparent. Only 6 out of the 80 institutions do not comply with transparency-tier 1 criteria. This might come from differences in regulations. More research is needed to evaluate this particularity.

For the lack of a sufficiently large sample size in the groups mentioned above, the significant results on the relation of the proportion of strongly focused MFIs and institutional maturity are discarded. The only noteworthy result for institutions from EECA is that in large institutions the proportion of rural borrowers increases with sustainability, i.e. large institutions which are more profitable have a higher proportion of rural borrowers than large but less profitable MFIs. The robustness of this result could be analyzed in further research. It will not be discussed in detail in this thesis, since the influence of sustainability on depth of outreach is not a main focus of this thesis. There is no evidence that depth of outreach decreases in institutional maturity in EECA.

2.2.3.4 Latin America and the Caribbean

Institutions from LAC made up the lion share of the dataset. It is the only region where there is no lack of observation for any combination of analyzed variables. One characteristic worth mentioning is, that institutions from LAC are much less likely to be transparency-tier 1 compliant than in any other region. Almost half of the institutions do not comply with the tier 1 criteria on the transparency dimension. This ratio is between 8% and 26% for the other regions. This could be a real phenomenon which occurs because of particularities in the

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economic, judiciary or political structures in LAC. It might also be that institutions are not in fact less transparent, but that they report less consequently to the mix, leading them to be classified as intransparent in the dataset.

For LAC, hypothesis 1 can certainly be confirmed. Mature institutions are significantly less likely to be strongly focused on both female and rural borrowers. With 19.6 and 17.4 percentage points, this decrease in proportions is quite substantial (table 13 and 14 in appendix D.1 and figure 14 and 15 in section 2.2.1.1).

Hypothesis 2 could not be verified. It is not only an institutions size which influences proportion of female and rural borrowers down for more mature institutions. Transparency seems to be the most important factor driving down the proportion of focused institution in tier 1. Concretely, transparency-tier 1 compliant institutions are between 9.4 and 18.5 percentage points less likely to be strongly focused on female borrowers than non-transparency-tier 1 compliant institutions. For the proportion of rural borrowers, this difference increases to 24.5 to 29.4 percentage points (table 15 and 16 in appendix D.1 and figure 15 and 17 in section 2.2.1.2).

There is no evidence, that sustainability-tier 1 compliant institutions are less likely to be strongly focused on female or rural borrowers. Size only becomes significant in determining whether an institution is strongly focused on female borrowers when looking at AUM on a continuous scale. The decrease in the estimated probability to be strongly focused on female borrowers is less than 1 percentage point for every 10% increase in AUM (table 17 in appendix d.1 and figure 18 in section 2.2.1.3).

Hypothesis 3 is also rejected in LAC. There is a 7.2 percentage points decrease in the mean proportion of female borrowers among non-focused institutions. For the proportion of rural borrowers, the difference is not significant (tables 20, 22 and 24 in appendix D.2).

2.2.3.5 Discussion

To test the interactions between institutional maturity and depth of outreach within EAP/SA, EECA and MENA/A, the amount of observations in the dataset was not large enough. More data is needed to evaluate the hypotheses in these regions. The data shows a large difference in depth of outreach between regions. Also, the trends suggest that the interaction between institutional maturity and depth of outreach is different in different regions. The regional differences in interactions between depth of outreach and characteristics of institutions has already been pointed out in Bolli & Vo Thi (2014). The reasons could be rooted in differences

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in geography, demography, culture, politics or industry structure. Further research is needed to shed light on those differences and their causes.

The only region where the results from the empirical analysis in this thesis led consistently significant results is LAC. There, the proportion of institutions with strong focus on female or rural borrowers decreases in institutional maturity. Thus hypothesis 1 can be confirmed. The decrease of the proportions of female and rural borrowers is driven by all dimensions of institutional maturity. Hypothesis 2 is thus also rejected. This decrease is also visible in the distribution of the proportion of female borrowers among non-focused institutions. Hypothesis 3 is therefore also rejected.

Hence, this study was able to show that there is a significant negative relation between depth of outreach and institutional maturity in LAC. As suspected, mature tier 1 institutions are not as likely to be strongly focused on female or rural borrowers. This decrease was expected to come from the larger size of more mature institutions. But size has only been shown to have a significant effect on the proportion of female borrowers when looking at AUM on a continuous scale. Transparency is the main driver for the decrease of depth of outreach in institutional maturity.

Transparency is measured by the level of third party oversight over an institution's financial statements and whether or not it is regulated. It could be, that institutions with less oversight over their reports are more likely to misreport the number of female and rural borrowers and exaggerate the numbers to attract more socially minded investors. Since the data is self-reported and there is only a limited degree of control by the MIX. It has already been shown in Krell (2014) that client protection practice reporting to the MIX was lowered significantly once an external validation process was introduced. In this case, the difference in depth of outreach between tier 1 institutions and others are attributable to poor data quality and the results are invalid.

Another possibility is that legislation affecting only regulated institutions has an impact on the composition of their clients and discourages them from focusing on women or rural areas only. Trujillo, Rodriguez-Lopez, & Muriel-Patino (2014) look at the influence of regulation on depth of outreach in LAC. They show that depth of outreach, measured by an institutions average loan balance, is lower for regulated institutions than for non-regulated institutions. It is argued, that this effect depends on the type of regulation. To evaluate this interpretation, the regulation in LAC countries and their effect on depth of outreach would have to be analyzed in depth.

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The proportion of female borrowers also decreases in institutional maturity among non-focused institutions. Sustainability-tier 1 compliance as well as sustainability and size as continuous variables have significant effects. The results suggest that for immature institutions, outreach to women decreases with larger size and increasing sustainability. But this effect is reversed for mature institutions, where a further increase in size and sustainability increases outreach to women. To the knowledge of the author of this thesis, this phenomenon has not been observed before.

A possible explanation is, that for small, immature and socially driven MFIs an increased focus on (financial) institutional maturity initially lowers depth of outreach. Resources have to be reallocated from the social part of the business to the financial part as they start to expand and intend to reach profitability. Arnedariz & Szafarz (2011) argue that because of the large wealth and income inequalities in Latin America, the scope for cross-subsidization is the largest among all regions. Consequently, small, unsustainable institutions are tempted to increase their profitability by extending their operations to new, wealthier and easier accessible groups.

Once the MFIs are large and profitable (i.e. mature), the positive effects of outreach to women on an institutions sustainability, which has been proven empirically many times (e.g. Martínez, 2015) come into play and institutions can actually increase profitability by targeting more women, allowing them to expand further in size. Since this thesis used cross-sectional models, the results do not directly imply anything on these dynamic. This narrative is just one possible interpretation on how these results could have emerged.

Conclusion and Recommendations

The aim of this thesis was to explore the relationship between institutional maturity and depth of outreach of MFIs. To this end, a literature analysis on the concepts of institutional maturity, depth of outreach, and their interaction was carried out. Further, empirical tests for the influence of institutional maturity on depth of outreach were performed, testing hypothesis 2, saying that size is the only dimension of institutional maturity with a significant influence on depth of outreach.

The development of financial institutions which are able to sustainably carry out their function, is a key objective of modern microfinance. As double bottom line institutions, MFIs serve a financial as well as a social function. Thus mature MFIs should be expected to have a strong financial and a strong social performance. Since financial inclusion is a key objective of many stakeholders in microfinance, one way of measuring an MFI's social performance is to evaluate its depth of outreach.

Common measures of institutional maturity do not take into account the social function of MFIs, measuring institutional maturity only by financial metrics. One such example is the tiered framework suggested by e-MFP (2013) and MicroRate (2013), defining an MFIs institutional maturity by its sustainability, size and transparency. A large number of research on the relationship between an MFI's sustainability on its depth of outreach shows, that there is not necessarily a trade off between the two.

The empirical analysis of this thesis instead focused on the connection between an institutions size and its depth of outreach, which has been studied much less. It was expected, that depth of outreach, measured as an institutions proportion of female and rural borrowers, decreases with an institution's size. It was further expected, that this only holds because there is a large number of small institutions with strong focus on those two groups.

This hypothesis was tested using MIX data from 2013, including 1410 observations. The data necessary to determine the tier, depth of outreach, and whether or not they are a specialized MFIs, was reported very unreliably. Thus the final sample was made up of 333 observations. This huge drop from the number of observations in the dataset to those in the sample shows the large potential for omitted variable bias, which is addressed in the thesis. Still, the small portion of MFIs providing all the necessary data to be included in the sample indicates, that there might be issues with the dataset used.

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Since an explorative data analysis has shown large differences between regions, separate models were fitted for each region. The amount of observations turned out to be too small to provide significant results for any other region than LAC.

For MFIs from LAC, the hypothesis could not be confirmed. Even though mature institutions are in fact less likely to be strongly focused on female and rural borrowers, this does not come from its size, but from its transparency. Also, contrary to the hypothesis, the proportion of female borrowers decreases in institutional maturity also for institutions without strong focus on female borrowers. Exceptions are institutions which are already very mature: For them, a further increase in size or sustainability seems to have a positive effect on the proportion of female borrowers. Further research could evaluate, whether this phenomenon can be replicated in other datasets.

There are two explanations for the negative relationship between transparency and the proportion of strongly focused institutions. On the one hand, it can either be attributed to misreportings of institutions who are not exposed to third party oversight (i.e. who are less transparent). Another explanation is, that regulated institutions are less likely to have a strong focus on a single group of clients.

The effect of increasing institutional maturity on depth of outreach is very different at different stages of development. For immature MFIs, an increase in maturity is expected to come with a decrease in depth of outreach. Conversely, for mature institutions, depth of outreach is positively related to institutional maturity. This is a factor which should be taken into account in further research on this interaction.

Limitations of this study and recommendations for further research

The lack of sufficient observations to get credible results from the proposed region specific tests was one important limitation of this study. Larger and more reliable datasets are needed to verify the results for LAC and get comparable results for other regions.

Further, in-depth research on how depth of outreach and institutional maturity are measured in a sensible way is needed. The tiered framework used to determine an institution's maturity has not been subject to much academic scrutiny. It is unclear, whether or not the thresholds for the separation of the tiers of MFIs lead to the intended classification of institutions. For example, this thesis has revealed, that an institutions size is responsible for a very large share of classifications in lower tiers, but that most institutions comply with tier 1 requirements according to their transparency and sustainability.

Considering the response variable, the proportion of female and rural borrowers are just one way of measuring depth of outreach. It would be interesting to look at the poverty level of clients and whether or not they had previous access to financial services. The collection and

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standardized reporting of such client level data, in the spirit of Sinha (2016), would greatly enhance the relevance of studies on the interaction between institutional maturity and depth of outreach.

It is concluded, that before digging deeper into the relationship between institutional maturity and depth of outreach, more research on how to measure each of these variables is needed. The interesting revelations about institutions in LAC and the regional differences in depth of outreach provide interesting starting points for new inquiries. Yet, the empirical results are to be regarded with caution, due to the mentioned limitations of study.

Second, the choice of both the dependent as well as the independent variables are not satisfactory. The tiered framework used to determine an institution's maturity has not been subject to much academic scrutiny. It is unclear how the threshold separating the tiers were chosen and whether or not they lead to the intended classification of institutions. This thesis has revealed, that an institutions size is responsible for a very large share of classifications in lower tiers, while most institutions comply with tier 1 requirements according to their transparency and sustainability.

Considering the response variable, the proportion of female and rural borrowers are obviously just one way of measuring depth of outreach. More interesting would be to look at the actual poverty level of an institution's clients or whether or not they had previous access to financial services. The collection and standardized reporting of such client level data would greatly enhance the relevance of studies on the interaction between institutional maturity and depth of outreach.

It is concluded, that before digging further into the relationship between institutional maturity and depth of outreach, more research on how to measure each of these variables is needed. The interesting revelations about institutions in LAC are to be regarded with caution, due to the mentioned limitations of study. Yet, the results show some interesting trends which can be analyzed more closely in future research.

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Appendix

A Data Management

The dataset used in this thesis is a combination of two MIX-Market datasets purchased by the Center for Microfinance at the University of Zürich from the MIX in 2014. They consist of data from the “Basic MIX MFI Data Set” and additional social performance data added by the MIX on a customary basis.

The data has been rearranged and combined such as to provide one uniquely identifiable observation per MFI and year. The MFIs are identified by their respective MFI-Id attributed by the MIX.

Monthly and quarterly observations and duplicates were removed. Additionally, all data points where there were multiple observations for one MFI-ID – year – combination were removed as well. The reason for those multiple reportings of annual data by certain MFIs is not visible from the datasets. Yet it can be assumed that some of them have changed reporting dates, while others seem to have mistakenly re-reported the data from the previous years before reporting the correct data. That some of those obviously misreported data has not been removed from the dataset previously indicates that the data to be handled with caution.

B Tier Calculations

The tiers of the MFIs are calculated on a yearly basis, based on the framework suggested by e-MFP (2013) and MicroRate (2013). This framework is described in section 1.1.2. To make the framework fit to work with our available dataset, it was adapted as suggested by Tosun (2015). Some additional clarifications were added to ensure reproducibility of the findings. Appendix B is an explanation how the tiers were determined exactly, based on the variables in available from the dataset introduced in appendix A.

B.1 Tier

The tiered framework used is based on the three dimensions size, sustainability and transparency. Every year, MFIs are assigned a value 1, 2 or 3 for each of those dimensions, corresponding to the tier they qualify for at this dimension. The overall tier for an MFI at the given year is the highest assigned value out of the three dimensions (i.e. the lowest level of compliance).

Formally this can be written as:

$$d_1 = \textit{Sustainability}$$

$$d_2 = \textit{Size}$$

$$d_3 = \textit{Transparency}$$

$$D = \{d_1, d_2, d_3\}$$

$$T_{d_i,t} \in \{1, 2, 3\}, i \in \{1, 2, 3\}$$

$$T_{D,t} = \{T_{d_1,t}, T_{d_2,t}, T_{d_3,t}\}$$

$$T_t = \max(T_{D,t})$$

where t is the year for which the tier is determined, $T_{d_i,t}$ is the lowest tier (highest level of institutional maturity) an MFI qualifies for at dimension d_i in year t and T_t is the overall tier of the institution.

Appendix

In this thesis, the overall tier is interpreted as an MFI's level of institutional maturity. Thus the value assigned at each individual dimensions can be interpreted as the highest level of institutional maturity they comply with. The value for the overall tier is then assigned according to the highest level of institutional maturity they comply with according to the criteria at each dimension. If any variable needed to evaluate whether an MFI qualifies for tier 1 or tier 2 is not reported, no value is assigned to the institutions tier at the respective year (and thus the MFI is not included in the inquiries of this thesis).

B.2 Sustainability

$T_{d_1,t}$ is defined as the lowest tier (highest level of institutional maturity) an MFI qualifies for according to its sustainability in a given year t . A value is assigned to $T_{d_1,t}$ according to a function of the returns on assets of the past three years. In the MIX dataset, the variable ROA_t contains the self-reported value for an MFIs return on assets in year t .

$$T_{d_1,t} = f(ROA_t, ROA_{t-1}, ROA_{t-2}) = \begin{cases} 1 & \text{if } ROA_i > -0.05, \forall i \in \{t, t-1, t-2\} \\ & \text{and } ROA_i > 0 \text{ for at least two } i \in \{t, t-1, t-2\} \\ 2 & \text{if } ROA_i > -0.05, \forall i = \{t, t-1, t-2\} \\ & \text{and } (ROA_i > 0 \text{ for one } i \in \{t, t-1, t-2\} \\ & \text{or } 0 > ROA_t > ROA_{t-1} > ROA_{t-2}) \\ 3 & \text{otherwise} \end{cases}$$

To qualify as a Tier 1 institution, an MFI needs to report a return on assets of no less than minus 5% for the three previous years *and* a positive return on assets for two out of the previous three years.

MFIs qualify as a Tier 2 institution, if the return on assets is larger than minus 5% for the three previous years. Additionally, a positive return on assets for one out of the previous three years or a positive trend in return on assets is needed. For this thesis, positive trend is defined as growing return on assets for two periods in a row.

MFIs who have reported return on assets for the past three years, but do not meet the requirements to qualify as tier 1 or tier 2 MFIs, are assigned to tier 3.

B.3 Size

$T_{d_2,t}$ is defined as the lowest tier (highest level of institutional maturity) an MFI qualifies for according to its size in a given year t . $T_{d_2,t}$ is uniquely determined by its assets under management in year t . The variable $assets_t$ contains the dollar value of assets under management reported by an MFI in year t .

Appendix

$$T_{d_2,t} = g(assets_t) = \begin{cases} 1 & \text{if } assets_t > USD\ 50'000'000 \\ 2 & \text{if } USD\ 50'000'000 \geq assets_t > USD\ 5'000'000 \\ 3 & \text{otherwise} \end{cases}$$

MFI's qualify as tier 1 institutions if they manage assets worth USD 50'000'000 or more, and as tier 2 if assets under management amount to more than USD 5'000'000. If they report assets under management worth less than 5'000'000 in the given year t , they are classified as Tier 3 institutions.

B.4 Transparency

Lastly, $T_{d_3,t}$ is defined as the lowest tier (highest level of institutional maturity) an MFI qualifies for according to its transparency in a given year t . $T_{d_3,t}$ is determined by whether or not it is a regulated institution and by the degree of reliability of the financial statements it provides. In the MIX dataset, the variable $regulated_t$ is a dummy variable with value 1 if the institution is regulated in year t and 0 otherwise. The variable $diamond_t$ or short $diam_t$, represents the level of reliability of the financial statements provided in year t . $diam_t$ takes on value 1 if they have a profile on the MIX-market website, value 2 if they provide some data on products and clients, and value 3 if they provide a financial statement to the MIX, value 4 if the institution has provided an audited financial statement and value 5 if it was rated or a due diligence report was published in year t Tosun (2015).

$$T_{d_3,t} = h(diam_t, diam_{t-1}, diam_{t-2}, regulated_t) = \begin{cases} 1 & \text{if } regulated_t = 1 \\ & \text{or } diam_i = 5 \text{ for at least one } i \in \{t, t-1\} \\ 2 & \text{if } diam_{t-2} \geq 4 \\ & \text{and } diam_i = 4, \forall i \in \{t, t-1\} \\ & \text{and } regulated_t = 0 \\ 3 & \text{otherwise} \end{cases}$$

Institutions qualify as tier 1 institutions if they are regulated or rated at least once in the past two years. To qualify as tier 2 institutions, an MFI needs to provide audited financial statements for three years in a row. MFIs which had a profile on the MIX-market website for the past three years, but do not qualify as tier 1 or tier 2 institutions, are classified as tier 3 institutions.

C Selection Bias

C.1 Distribution of Variables in Specialized and Non-Specialized MFIs

Table 7: Distribution of tiers in specialized and non-specialized institutions

Tier		
	Tier 2 and 3	Tier 1
non-specialized	7	13
specialized	364	124

Source: MIX

Table 8: Distribution of size in specialized and non-specialized institutions

Size (AUM in millions)								
Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NAs		
non-specialized	0.345	27.710	85.610	314	215.500	2,760	0	
specialized	0.009	4.561	16.750	115	62.620	6,130	23	

Source: MIX

Table 9: Distribution of FEMALE in specialized and non-specialized institutions

FEMALE							
	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NAs
non-specialized	16.1 %	33.2 %	39.6 %	42.5 %	50.1 %	77.1 %	12
specialized	0.4 %	43.3 %	62.3 %	63.9 %	90.3 %	100 %	104

Source: MIX

Appendix

Table 10: Distribution of RURAL in specialized and non-specialized institutions

RURAL	=====						
	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's

non-specialized	6 %	27.4 %	44.7 %	44 %	63.7 %	85.4 %	21
specialized	0.1 %	32.5 %	57.4 %	54.8 %	77.9 %	100 %	229

Source: MIX

C.2 Distribution of Variables in Included and Excluded MFIs (Specialized MFIs only)

C.2.1 Distribution of tiers

Table 11: Distribution across tiers (in percent) in included and excluded MFIs (specialized institutions only)

Tier (in percent)	=====	
	Tier 2 and 3	Tier 1

Included	75.1	24.9
Excluded	73.5	26.5

Source: MIX

Appendix

C.2.2 Distribution across regions

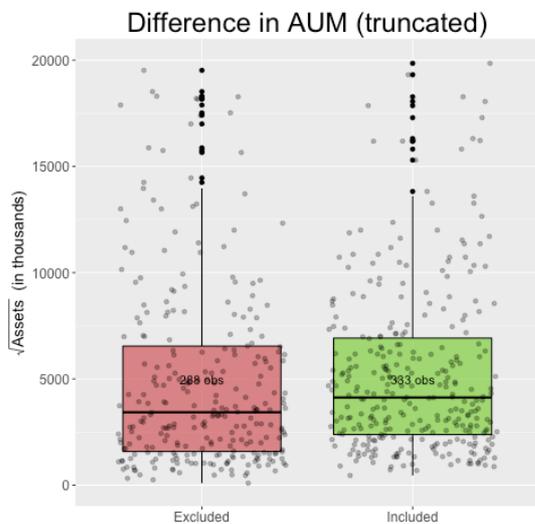
Table 12: Distribution across regions (in percent) in included and excluded MFIs (specialized institutions only)

Regions (in percent)				
	EAP/SA	EECA	LAC	MENA/A
Included	20.7	24	47.4	7.8
Excluded	23.2	10	40.2	26.7

Source: MIX

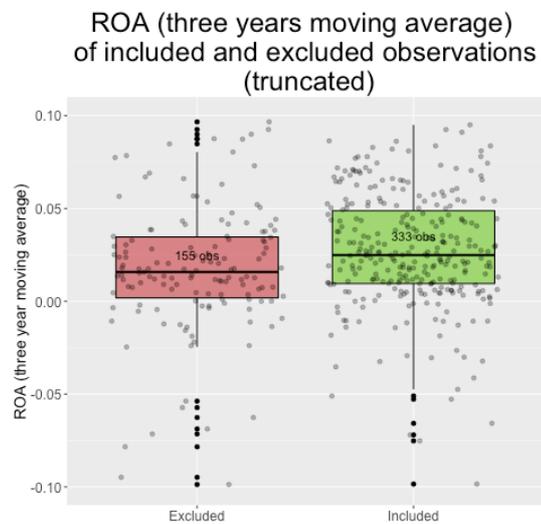
C.2.3 Distribution of AUM and ROA in included and excluded MFIs

Figure 26: Difference in AUM between included and excluded institutions (specialized institutions only)



Source :Own graphic, based on MIX data

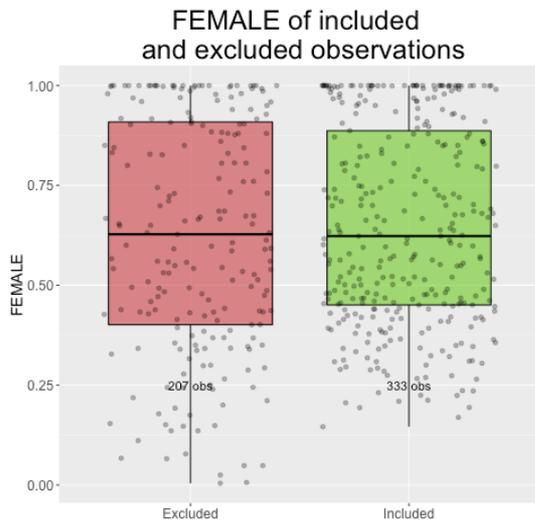
Figure 27: Difference in ROA between included and excluded institutions (specialized institutions only)



Source :Own graphic, based on MIX data

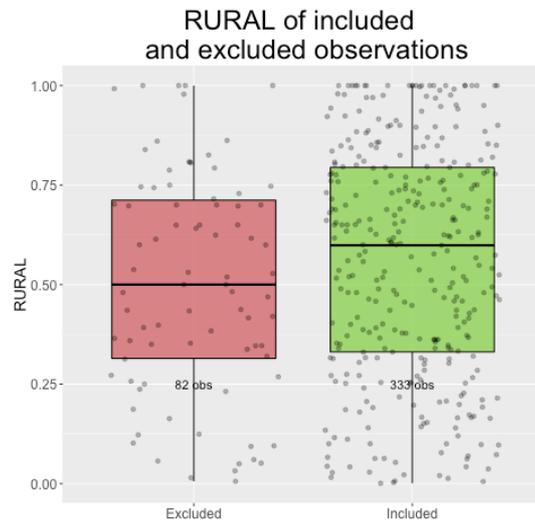
C.2.4 Distribution of FEMALE and RURAL in included and excluded MFIs

Figure 28: Difference in FEMALE between included and excluded institutions (specialized institutions only)



Source :Own graphic, based on MIX data

Figure 29: Difference in RURAL between included and excluded institutions (specialized institutions only)



Source :Own graphic, based on MIX data

D Results

D.1 Models 1.1 – 1.3: FOCUSFEMALE and FOCUSRURAL

D.1.1 Test 1.1: Institutional maturity and FOCUSFEMALE / FOCUSRURAL

Test 1.1.1: Difference in FOCUSFEMALE between tier 1 institutions and others (Fisher exact test for differences in proportions)

Test 1.1.1:

$$FOCUSFEMALE_{tier1} < FOCUSFEMALE_{tier2\&3}$$

Fisher test in R (ETH Zürich, n.d.-a)

Table 13: Test 1.1.1: Empirical results from a Fisher exact test for a difference in the proportion of FOCUSFEMALE between tier 1 institutions and others

Region: EAP/SA				
	Observations	ProportionFOCUSFEMALE	Difference	P-Value
Tier 2/3	50	0.860		
Tier 1	19	0.895	0.035	1
Note:			*p<0.05; **p<0.01; ***p<0.001	
Region: EECA				
	Observations	ProportionFOCUSFEMALE	Difference	P-Value
Tier 2/3	60	0.067		
Tier 1	20	0	-0.067	0.567
Note:			*p<0.05; **p<0.01; ***p<0.001	
Region: LAC				
	Observations	ProportionFOCUSFEMALE	Difference	P-Value
Tier 2/3	120	0.275		
Tier 1	38	0.079	-0.196*	0.014
Note:			*p<0.05; **p<0.01; ***p<0.001	
Region: MENA/A				
	Observations	ProportionFOCUSFEMALE	Difference	P-Value
Tier 2/3	20	0.450		
Tier 1	6	0	-0.450	0.063
Note:			*p<0.05; **p<0.01; ***p<0.001	

Source: MIX

Appendix

Model: 1.1.2. Difference in FOCUSRURAL between tier 1 institutions and others

Test 1.1.2:

$$FOCUSRURAL_{tier1} < FOCUSRURAL_{tier2\&3}$$

Fisher test in R (ETH Zürich, n.d.-a)

Table 14: Test 1.1.2: Empirical results from a Fisher exact test for a difference in the proportion of FOCUSRURAL between tier 1 institutions and others

Region: EAP/SA

	Observations	ProportionFOCUSRURAL	Difference	P-Value
Tier 2/3	50	0.400		
Tier 1	19	0.632	0.232	0.109
Note:	*p<0.05; **p<0.01; ***p<0.001			

Region: EECA

	Observations	ProportionFOCUSRURAL	Difference	P-Value
Tier 2/3	60	0.233		
Tier 1	20	0.250	0.017	1
Note:	*p<0.05; **p<0.01; ***p<0.001			

Region: LAC

	Observations	ProportionFOCUSRURAL	Difference	P-Value
Tier 2/3	120	0.200		
Tier 1	38	0.026	-0.174**	0.009
Note:	*p<0.05; **p<0.01; ***p<0.001			

Region: MENA/A

	Observations	ProportionFOCUSRURAL	Difference	P-Value
Tier 2/3	20	0.200		
Tier 1	6	0	-0.200	0.542
Note:	*p<0.05; **p<0.01; ***p<0.001			

Source: MIX

Appendix

D.1.2 Test 1.2: Dimensions of institutional maturity and FOCUSFEMALE / FOCUSRURAL

Model 1.2.1: Influence of tier 1 compliance at each dimension of institutional maturity on FOCUSFEMALE

Model 1.2.1:

$$\text{logit}(\text{FOCUSFEMALE}) = \beta_0 + \beta_1 * \text{tier_sust1} + \beta_2 * \text{tier_size1} + \beta_3 * \text{tier_transp1}$$

Logistic regression in R (ETH Zürich, n.d.-b)

Table 15: Testing model 1.2.1: Empirical results from a logistic regression testing the influence of an MFI's sustainability, size and transparency on the proportion of female borrowers

Regression Results

Dependent variable:				
	FOCUSFEMALE			
	EAP/SA	EECA	LAC	MENA/A
	(1)	(2)	(3)	(4)
Sustainability	1.392	18.796	0.249	-0.358
	p = 0.100	p = 0.997	p = 0.645	p = 0.727
Size	-1.100	-17.498	-0.809	-1.233
	p = 0.163	p = 0.997	p = 0.199	p = 0.347
Transparency	1.317	-3.068*	-0.994*	-0.441
	p = 0.126	p = 0.013	p = 0.033	p = 0.669
Constant	0.304	-18.796	-0.850	0.169
	p = 0.753	p = 0.997	p = 0.080	p = 0.882
Observations	69	80	158	26
Log Likelihood	-23.733	-10.955	-78.843	-15.692
Akaike Inf. Crit.	55.466	29.909	165.686	39.385

Note: *p<0.05; **p<0.01; ***p<0.001

Sustainability = tier_sust1

Size = tier_size1

Transparency = tier_transp1

Source: MIX

Appendix

Model 1.2.2: Influence of tier 1 compliance at each dimension of institutional maturity on FOCUSRURAL

Model 1.2.2.:

$$\text{logit}(\text{FOCUSRURAL}) = \beta_0 + \beta_1 * \text{tier_sust1} + \beta_2 * \text{tier_size1} + \beta_3 * \text{tier_transp1}$$

Logistic regression in R (ETH Zürich, n.d.-b)

Table 16: Testing model 1.2.2: Empirical results from a logistic regression testing the influence of an MFI's sustainability, size and transparency on the proportion of rural borrowers

Regression Results

Dependent variable:				
FOCUSRURAL				
	EAP/SA	EECA	LAC	MENA/A
	(1)	(2)	(3)	(4)
Sustainability	-0.145	-0.759	-0.179	-19.555
	p = 0.836	p = 0.298	p = 0.754	p = 0.997
Size	0.763	0.302	-0.090	-16.825
	p = 0.135	p = 0.634	p = 0.921	p = 0.998
Transparency	-0.297	-0.435	-2.723**	-19.267
	p = 0.649	p = 0.646	p = 0.002	p = 0.997
Constant	-0.067	-0.207	-0.731	18.168
	p = 0.936	p = 0.835	p = 0.140	p = 0.997
Observations	69	80	158	26
Log Likelihood	-46.440	-43.150	-56.598	-7.001
Akaike Inf. Crit.	100.881	94.300	121.196	22.001

Note: *p<0.05; **p<0.01; ***p<0.001

Sustainability = tier_sust1

Size = tier_size1

Transparency = tier_transp1

Source: MIX

Appendix

D.1.3 Test 1.3: AUM / ROA and FOCUSFEMALE / FOCUSRURAL

Model 1.3.1: Influence of AUM and ROA on FOCUSFEMALE

Model 1.3.1:

$$\text{logit}(\text{FOCUSFEMALE}) = \beta_0 + \beta_1 * \log(\text{AUM}) + \beta_2 * \text{Average_ROA} + \beta_3 * \text{tier_transp1} + \beta_4 * \log(\text{AUM}) : \text{Average_ROA}$$

Logistic regression in R (ETH Zürich, n.d.-b)

Table 17: Testing model 1.3.1: Empirical results from a logistic regression testing the influence of an MFI's AUM and ROA on the proportion of female borrowers

Regression Results

```

=====
                                Dependent variable:
                                -----
                                FOCUSFEMALE
                                EAP/SA      EECA      LAC      MENA/A
                                (1)        (2)        (3)        (4)
                                -----
log(AUM)                        -0.606*    0.029     -0.503*   -0.923
                                p = 0.032  p = 0.971  p = 0.023  p = 0.122
Average ROA                      -125.766   12.930    10.457    -100.461
                                p = 0.070  p = 0.939  p = 0.835  p = 0.495
tier_transp1                      1.676     -3.717*   -0.301     -0.995
                                p = 0.088  p = 0.039  p = 0.567  p = 0.372
log(AUM) : Average ROA           6.702      0.465     -0.079     6.196
                                p = 0.083  p = 0.965  p = 0.980  p = 0.497
Constant                          11.755*   -1.581     6.849*    15.206
                                p = 0.021  p = 0.891  p = 0.044  p = 0.128
                                -----
Observations                       67         80        158        26
Log Likelihood                    -20.171   -11.512   -73.896   -13.399
Akaike Inf. Crit.                  50.341    33.024    157.792    36.798
=====

```

Note: *p<0.05; **p<0.01; ***p<0.001

Source: MIX

Appendix

Model 1.3.2: Influence of AUM and ROA on FOCUSRURAL

Model 1.3.2:

$$\text{logit}(\text{FOCUSRURAL}) = \beta_0 + \beta_1 * \log(\text{AUM}) + \beta_2 * \text{Average_ROA} + \beta_3 * \text{tier_transp1} + \beta_4 * \log(\text{AUM}) : \text{Average_ROA}$$

Logistic regression in R (ETH Zürich, n.d.-b)

Table 18: Testing model 1.3.2: Empirical results from a logistic regression testing the influence of an MFI's AUM and ROA on the proportion of rural borrowers

Regression Results

=====				
Dependent variable:				

	FOCUSRURAL			
	EAP/SA	EECA	LAC	MENA/A
	(1)	(2)	(3)	(4)

log(AUM)	0.289	-0.034	0.283	0.415
	p = 0.117	p = 0.863	p = 0.278	p = 0.652
Average ROA	65.802	-2.271	96.151	160.324
	p = 0.222	p = 0.968	p = 0.182	p = 0.491
tier_transp1	0.059	-0.364	-3.234***	-3.964
	p = 0.938	p = 0.711	p = 0.001	p = 0.063
log(AUM) :Average ROA	-3.161	-0.053	-6.114	-12.075
	p = 0.297	p = 0.989	p = 0.181	p = 0.411
Constant	-5.536	-0.155	-5.228	-6.170
	p = 0.086	p = 0.960	p = 0.199	p = 0.690

Observations	67	80	158	26
Log Likelihood	-42.491	-43.447	-55.346	-6.902
Akaike Inf. Crit.	94.983	96.893	120.693	23.804
=====				

Note: *p<0.05; **p<0.01; ***p<0.001

Source: MIX

D.2 Models 2.1 – 2.3: FEMALE and RURAL in non-focused MFIs

D.2.1 test 2.1: Institutional maturity and FEMALE / RURAL in non-focused institutions

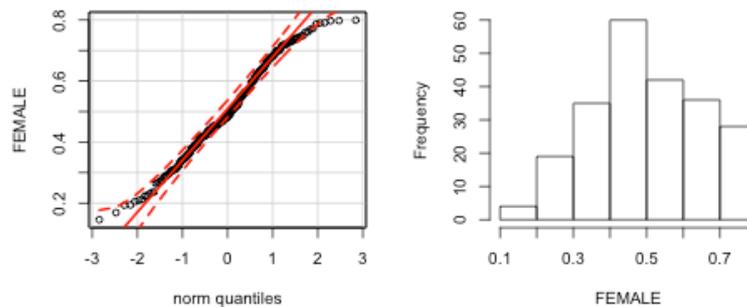
Test 2.1.1: Difference in the mean of FEMALE between tier 1 institutions and others in non-focused institutions (t-test)

Test 2.1.1

$$FEMALE_{tier1} = FEMALE_{tier2\&3}$$

Distribution of FEMALE in non-focused institutions:

Figure 30: Distribution of the proportion of female borrowers in non-focused institutions



Source: Own graphic, based on MIX data

Appendix

T-test in R (ETH Zürich, n.d.-d)

Table 19: Test 2.1.1: Empirical results from a student's t-test, testing the difference in means of the proportion of female borrowers between tier 1 institutions and others in non-focused institutions

Region: EAP/SA				
	Observations	Mean	SD	
Tier 2/3	7	0.625	0.169	
Tier 1	2	0.730	0.096	0.105 0.339
Note:				*p<0.05; **p<0.01; ***p<0.001
Region: EECA				
	Observations	Mean	SD	
Tier 2/3	56	0.423	0.159	
Tier 1	20	0.416	0.168	-0.007 0.867
Note:				*p<0.05; **p<0.01; ***p<0.001
Region: LAC				
	Observations	Mean	SD	
Tier 2/3	87	0.558	0.135	
Tier 1	35	0.486	0.100	-0.072** 0.002
Note:				*p<0.05; **p<0.01; ***p<0.001
Region: MENA/A				
	Observations	Mean	SD	
Tier 2/3	11	0.518	0.140	
Tier 1	6	0.543	0.102	0.025 0.677
Note:				*p<0.05; **p<0.01; ***p<0.001

Source: MIX

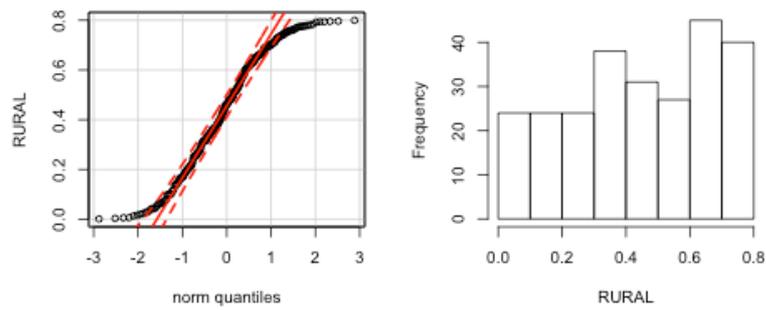
Appendix

Test 2.1.2: Difference in the mean of RURAL between tier 1 institutions and others in non-focused institutions (Wilcoxon-test)

Test 2.1.2

$$RURAL_{tier1} = RURAL_{tier2\&3}$$

Figure 31: Distribution of the proportion of rural borrowers in non-focused institutions



Source: Own graphic, based on MIX data

Appendix

Wilcoxon test in R (ETH Zürich, n.d.-e)

Table 20: Test 2.1.2: Empirical results from a Wilcoxon test, testing the difference in means of the proportion of female clients between tier 1 institutions and others in non-focused institutions

Region: EAP/SA

=====				=====	
	Observations	Mean	SD	Difference	P-Value

Tier 2/3	30	0.573	0.193		
Tier 1	7	0.489	0.254	-0.083	0.435

Note:	*p<0.05; **p<0.01; ***p<0.001				

Region: EECA

=====				=====	
	Observations	Mean	SD	Difference	P-Value

Tier 2/3	46	0.428	0.224		
Tier 1	15	0.551	0.225	0.123	0.052

Note:	*p<0.05; **p<0.01; ***p<0.001				

Region: LAC

=====				=====	
	Observations	Mean	SD	Difference	P-Value

Tier 2/3	96	0.410	0.236		
Tier 1	37	0.372	0.209	-0.038	0.375

Note:	*p<0.05; **p<0.01; ***p<0.001				

Region: MENA/A

=====				=====	
	Observations	Mean	SD	Difference	P-Value

Tier 2/3	16	0.510	0.268		
Tier 1	6	0.403	0.097	-0.107	0.294

Note:	*p<0.05; **p<0.01; ***p<0.001				

Source: MIX

Appendix

D.2.2 Test 2.2: Dimensions of institutional maturity and FEMALE / RURAL in non-focused institutions

Model 2.2.1: Influence of tier 1 compliance at each dimension of institutional maturity on FEMALE in non-focused institutions

Model 2.2.1:

$$FEMALE = \beta_0 + \beta_1 * tier_sust1 + \beta_2 * tier_size1 + \beta_3 * tier_transp1$$

Linear regression in R (ETH Zürich, n.d.-c)

Table 21: Model 2.2.1: Empirical results from a linear regression, testing the influence of an MFI's sustainability, size and transparency on its proportion of female borrowers

Regression Results

Dependent variable:				
	FEMALE			
	EAP/SA (1)	EECA (2)	LAC (3)	MENA/A (4)
Sustainability	0.242*	-0.094	-0.068*	0.029
	p = 0.034	p = 0.092	p = 0.049	p = 0.746
Size	0.146	0.005	-0.036	-0.002
	p = 0.097	p = 0.902	p = 0.207	p = 0.984
Transparency	0.078	0.082	-0.022	0.039
	p = 0.311	p = 0.338	p = 0.416	p = 0.676
Constant	0.323*	0.423***	0.620***	0.478***
	p = 0.017	p = 0.00001	p = 0.000	p = 0.0003
Observations	8	76	122	17
R2	0.832	0.044	0.084	0.027
Adjusted R2	0.706	0.005	0.061	-0.198
Residual SE	0.091	0.160	0.126	0.137
	(df = 4)	(df = 72)	(df = 118)	(df = 13)
F Statistic	6.613*	1.113	3.630*	0.120
	(df = 3; 4)	(df = 3; 72)	(df = 3; 118)	(df = 3; 13)

Note:

*p<0.05; **p<0.01; ***p<0.001

Sustainability = tier_sust1

Size = tier_size1

Transparency = tier_transp1

Source: MIX

Appendix

Model 2.2.2: Influence of tier 1 compliance at each dimension of institutional maturity on RURAL in non-focused institutions

Model 2.2.2:

$$RURAL = \beta_0 + \beta_1 * tier_sust1 + \beta_2 * tier_size1 + \beta_3 * tier_transp1$$

Linear regressino in R (ETH Zürich, n.d.-c)

Table 22: Model 2.2.2: Empirical results from a linear regression testing the influence of an MFI's sustainability, size and transparency on its proportion of rural borrowers

Regression Results

Dependent variable:				
	RURAL			
	EAP/SA	EECA	LAC	MENA/A
	(1)	(2)	(3)	(4)
Sustainability	0.066	-0.017	0.043	-0.119
	p = 0.524	p = 0.861	p = 0.492	p = 0.375
Size	-0.030	0.106	-0.059	-0.138
	p = 0.699	p = 0.122	p = 0.233	p = 0.260
Transparency	0.016	0.227	0.023	0.102
	p = 0.869	p = 0.067	p = 0.623	p = 0.436
Constant	0.495***	0.235	0.367***	0.533**
	p = 0.0004	p = 0.056	p = 0.000	p = 0.004
Observations	37	61	133	22
R2	0.020	0.112	0.013	0.233
Adjusted R2	-0.070	0.065	-0.010	0.105
Residual SE	0.211	0.221	0.230	0.223
	(df = 33)	(df = 57)	(df = 129)	(df = 18)
F Statistic	0.220	2.390	0.585	1.819
	(df = 3; 33)	(df = 3; 57)	(df = 3; 129)	(df = 3; 18)

Note: *p<0.05; **p<0.01; ***p<0.001

Sustainability = tier_sust1

Size = tier_size1

Transparency = tier_transp1

Source: MIX

Appendix

D.2.3 Test 2.3: AUM / ROA and FEMALE / RURAL in non-focused institutions

Model 2.3.1: Influence of AUM and ROA on FEMALE in non-focused institutions

Model 2.3.1:

$$FEMALE = \beta_0 + \beta_1 * \log(AUM) + \beta_2 * Average_ROA + \beta_3 * \log(AUM) : Average_ROA$$

Linear regression in R (ETH Zürich, n.d.-c)

Table 23: Model 2.3.1: Empirical results from a linear regression testing the influence of an MFI's AUM and ROA on its proportion of female borrowers

Regression Results

Dependent variable:				
	FEMALE			
	EAP/SA (1)	EECA (2)	LAC (3)	MENA/A (4)
log(AUM)	0.029*	-0.012	-0.032***	0.010
	p = 0.016	p = 0.370	p = 0.00002	p = 0.730
Average ROA	-0.948	-2.239	-8.155***	13.839
	p = 0.608	p = 0.569	p = 0.001	p = 0.497
log(AUM) :Average ROA	0.201	0.161	0.473**	-0.805
	p = 0.124	p = 0.521	p = 0.002	p = 0.506
Constant	0.025	0.606**	1.079***	0.380
	p = 0.861	p = 0.007	p = 0.000	p = 0.449
Observations	8	76	122	17
R2	0.961	0.019	0.186	0.066
Adjusted R2	0.933	-0.022	0.165	-0.150
Residual SE	0.043	0.162	0.119	0.134
	(df = 4)	(df = 72)	(df = 118)	(df = 13)
F Statistic	33.248**	0.473	8.998***	0.306
	(df = 3; 4)	(df = 3; 72)	(df = 3; 118)	(df = 3; 13)

Note:

*p<0.05; **p<0.01; ***p<0.001

Source: MIX

Appendix

Model 2.3.2 Influence of AUM and ROA on RURAL in non-focused institutions

Model 2.3.2:

$$RURAL = \beta_0 + \beta_1 * \log(AUM) + \beta_2 * Average_ROA + \beta_3 * \log(AUM) : Average_ROA$$

Linear regressin in R (ETH Zürich, n.d.-c)

Table 24: Model 2.3.2: Empirical results from a linear regression, testing the influence of an MFI's AUM and ROA on its proportion of rural borrowers

Regression Results

Dependent variable:				
	RURAL			
	EAP/SA	EECA	LAC	MENA/A
	(1)	(2)	(3)	(4)
log (AuM)	0.004	0.006	-0.020	-0.021
	p = 0.877	p = 0.771	p = 0.116	p = 0.616
Average ROA	11.351	-19.844**	-3.015	-25.019
	p = 0.128	p = 0.008	p = 0.474	p = 0.143
log (AuM) :Average ROA	-0.645	1.273**	0.182	1.478
	p = 0.130	p = 0.006	p = 0.484	p = 0.154
Constant	0.471	0.292	0.740***	0.778
	p = 0.293	p = 0.394	p = 0.001	p = 0.293
Observations	37	61	133	22
R2	0.081	0.243	0.020	0.186
Adjusted R2	-0.003	0.204	-0.003	0.051
Residual SE	0.205	0.204	0.229	0.230
	(df = 33)	(df = 57)	(df = 129)	(df = 18)
F Statistic	0.968	6.111**	0.879	1.373
	(df = 3; 33)	(df = 3; 57)	(df = 3; 129)	(df = 3; 18)

Note:

*p<0.05; **p<0.01; ***p<0.001

Source: MIX