The Finance of Microfinance: Liquidity Creation in Deposit-Taking Microfinance Institutions

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Abstract

As microfinance moves beyond its traditional function as a niche development tool and towards becoming an integrated and self-sustainable part of the formal financial market, the need to deepen our understanding of its players and their financial and organisational behaviour increases. However, with primary focus in most research being on the social and cultural side of microfinance, the study of the financial behaviour of its institutions has been neglected.

This thesis explores the ability of microfinance institutions (MFIs) to function as liquidity creators for the market, on par with more traditional financial intermediaries. Using fixed effects estimations, it evaluates a range of financial and developmental drivers of liquidity creation (LC), including deposit insurance, capital ratio and risk profile. In addition to these, essays 2 and 3 evaluate the impact of specialisation and the regulatory framework, as well as a range of conditions unique to development and microfinance, such as joint lending methodologies, profit-status and the Human Development Index (HDI).

In essay 1, I find that microfinance institutions are able to create liquidity for the surrounding market, on par with, and at times surpassing, more traditional financial intermediaries. These results are similar across geographical regions and organisational types, and are positively impacted by the presence of formal regulation. However, contrary to the suggestion of traditional banking theory, the presence of deposit insurance does not appear to have significant impact on the level of liquidity created, nor does it appear to be primarily pushed by the institution's risk profile. Instead, my findings suggest that the primary drivers of liquidity creation should be found elsewhere.

In essay 2, I find strong, consistent and positive correlation between levels of liquidity creation and the use of joint lending methodologies by microfinance intermediaries, in particular group loans. The effect is observed across all 4 LC measurements, and in both models presented. The findings support the theoretical suggestion that joint lending serves as a form of risk mitigator for MFIs in the absence of traditional collateral. In addition, it suggests that while microfinance institutions as previously found are able to create liquidity on par with traditional intermediaries, the mechanisms behind the successful production

are different. The unique conditions in developing and emerging financial markets appear to drown out the effects of most (though not all) of the more traditional financial drivers.

Finally, in essay 3, a two-tiered approach is used to study the effect of formal regulatory and supervisory frameworks, using MIX and World Bank data in cross-country and regional estimations. The results suggest a consistent, strong and positive effect of regulation, across very diverse areas, in terms of formalised financial frameworks and levels of development.

The thesis adds to the relatively new and still scarce empirical research on liquidity creation in general, and brings attention to the unique conditions facing financial intermediaries in emerging and especially developing financial markets. It specifically provides some first insights into the creation of liquidity in microfinance, and explores the drivers of LC by studying the impact of a range of traditional, development- and microfinance-specific variables. The empirical work adds an in-depth, cross-country look at the creation of liquidity, and provides academics, policy-makers and practitioners alike with a much needed new insight into the external financial performance of microfinance institutions, and their ability to live up to their societal role as liquidity creators for the surrounding market.

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Abbreviations

ADB – Asian Development Bank

APF – Asia-Pacific Framework

C&I – Commercial and Industrial Loans

DANIDA – The Danish International Development Agency

DEP - Deposits

EAP – East Asia and the Pacific

EECA – Eastern Europe and Central Asia

E - Equity

EQRAT – Equity Ratio

GLP – Gross Loan Portfolio

GTA – Gross Total Assets

IMF – International Monetary Fund

LAC – Latin America and the Caribbean

LC – Liquidity Creation

MENA – Middle East and North Africa

MFI – Microfinance Institutions

MIV – Microfinance Investment Vehicle

MIX – Microfinance Information Exchange

NORAD – Norwegian Agency for Development Coorperation

ROSCA – Rotating Savings and Credit Association

SA – South Asia

SACCO – Savings and Credit Organisation

USAID – United States Agency for International Development

WB – The World Bank

1. Introduction

Microfinance institutions (MFIs) are financial intermediaries that provide a range of microloans and other financial services, usually to poor, marginalised and previously unbanked clients, who are outside the reach of traditional banks (Cull et al., 2013b). The MFIs typically use a market approach to their lending and repayment activities, and ensure continued high levels of repayment, despite the absence of collateral, by employing a range of innovative lending methodologies, such as joint lending schemes and relationship-based banking models (Armendáriz and Morduch, 2010). These innovative methodologies are used as risk-reducing mechanisms, in an attempt to compensate for the high costs of transactions, screenings, monitoring and contract enforcement, which historically have priced out more traditional intermediaries.

The size of institutions, both in terms of borrowers and assets, vary significantly from region to region, with most of the microfinance clients found in South Asia, specifically India and Bangladesh, while the number of institutions engaging in microfinance is highest in Latin America and the Caribbean (Figure 1.1 and 1.4).

Figure 1.1: % of Borrowers and MFIs per Region, 2004 - 2015
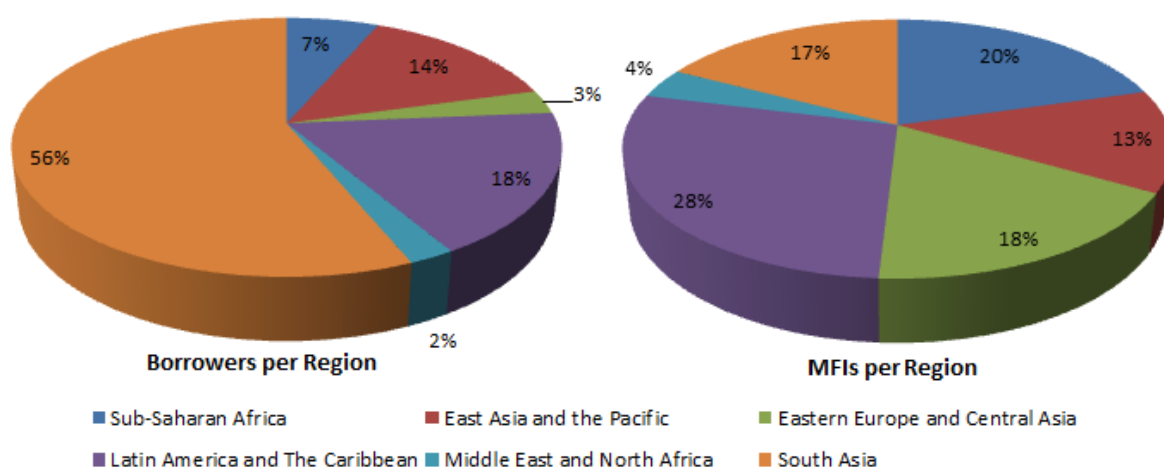
There is an estimated 10,000 MFIs globally, though as many as 80% of these are believed to be small, informal entities (Hailey et al., 2016). Although the exact volume of extended loans is somewhat uncertain, recent data from the MIX database, found a combined gross loan portfolio of $US 114bn, extended to 139mn borrowers (Convergences, 2018).

However, available asset estimations vary significantly between surveys, and so far there exists no comprehensive map of the industry. The 2016 survey of microfinance investment vehicles (MIVs) done by the Symbiotics, suggested a combined asset pool of about 11.6 bn, held by fixed investment, mixed and equity funds (Symbiotics, 2016; Khamar, 2017).

Although the concept of microfinance has a long history behind it, with roots stretching back into antiquity, the use of modern microfinance has primarily been as a poverty reduction tool in development.

However, over the past two decades, microfinance has gained increased acceptance as a viable if niche financial sector, and has seen growth in both emerging and developed markets (Khamar, 2017). After suffering the effects of the 2008 financial crisis, the sector has bounced back, and the global portfolio grew 15.6 in 2017 (Convergences, 2018).

1.1. Definition of Microfinance

Looking back throughout history, microfinance has its primary roots in various forms of microcredit schemes, where very small loans were specifically designed to reach the poor, the marginalised or otherwise unbanked. Even in modern microfinance, the methodology initially centred on microcredit, the extension of small loans, either through some form of relationship banking, or via joint lending approaches, in the form of group and village loans (Christen et al., 2004). Today, the concept of microfinance has been broadened significantly from its inception, and is used as an umbrella term for a range of financial services, though its target clientele is still the poorer segments of society. These services cover not just microcredit, but also savings, insurance as well as the ability to transfer funds. Microfinance is seen as one form of impact investing, where the specified goal of an investment is, in addition to a reasonable financial return, to create environmental, social or (corporate) governance (ESG) impact (CGAP, 2013).

Figure 1.2: Loans and Borrowers per Region, by Location, 2004 - 2015

Loans per Region by Location

Borrowers per Region by Location

■ Urban ■ Rural
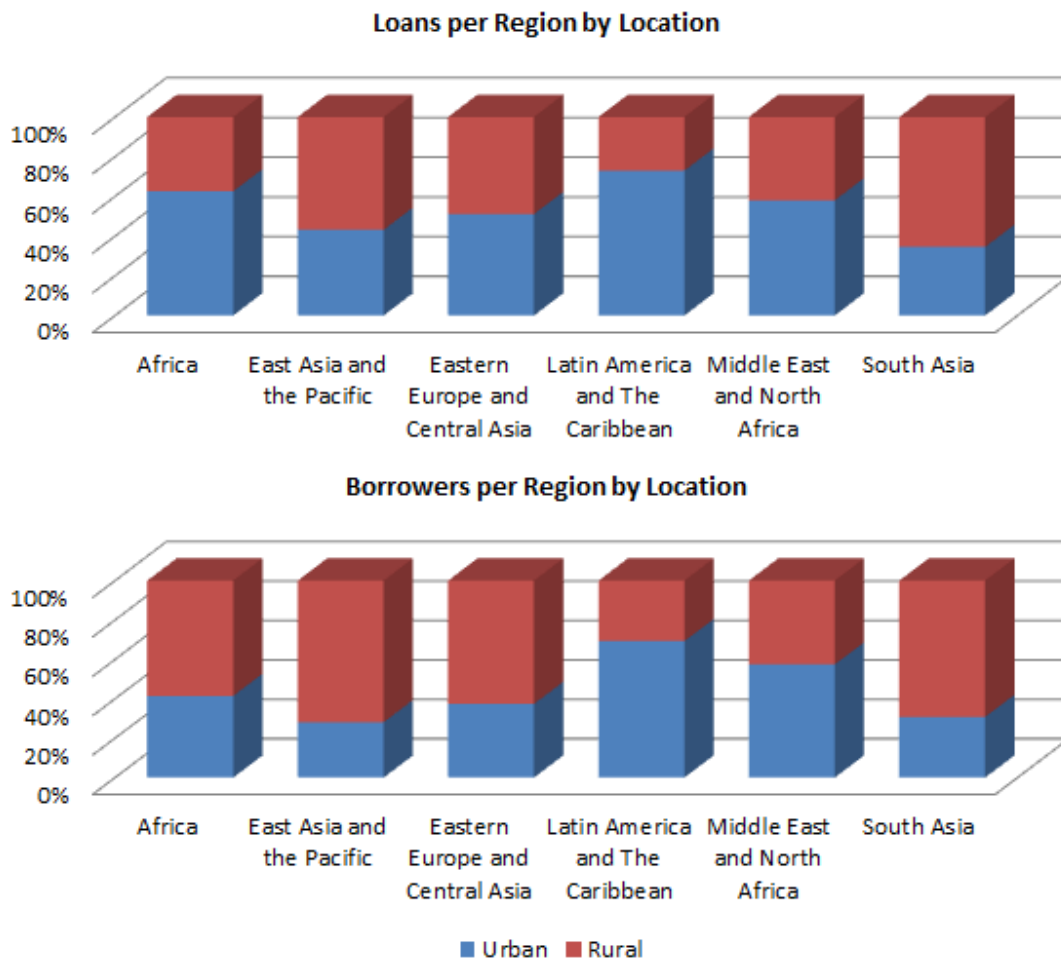
The loans are typically extended to small and informal agricultural ventures or microenterprises, and are usually given without a collateral requirement. The loan sizes currently average $2500 in Eastern Europe and Central Asia, but as little as $250 in South Asia (Convergences 2015, citing MIX benchmarks). In comparison, the average commercial and industrial (C&I) loan size for a standard non-microfinancial commercial bank with assets over $3.7 billion was $400,000 in 2011, $95,000 in smaller banks (Gup, 2011:115).

With exception of Latin America, most loans are still given primarily to rural clients outside of the reach of traditional financial institutions, though urban microfinance is growing, especially in Africa, where small micro-business ventures and salary-based microfinance is finding increased footing (figure 1.2 and Convergences 2018).

Microfinance is still heavily aimed at female clients, though it varies some by region, loan size and organizational type. In South Asia, where loans are small and often given as group loans, by far the majority of clients are women. In Eastern Europe, however, where individual lending is the primary lending methodology, and the loan are larger, the male-female distribution in terms of total GLP is about 50%, while there are still slightly more female borrowers than male (figure 1.3).

Figure 1.3: Loans and Borrowers per Region, by Gender, 2004 – 2015

Loans per Region by Gender

Borrowers per Region by Gender

■ Male ■ Female ■ Other - e.g. Groups
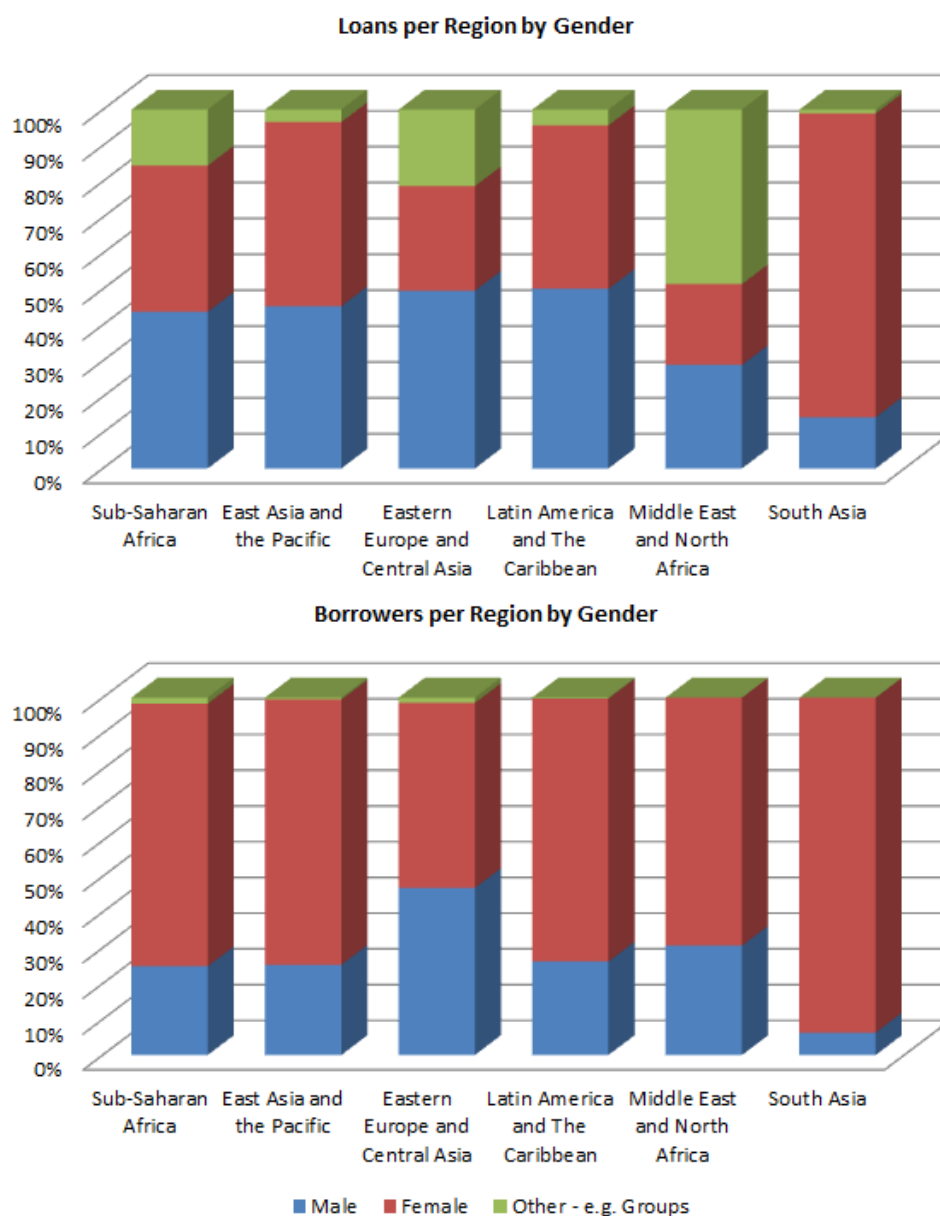
For all regions, the percentage difference between men and women is larger in favour of the women when it comes to numbers of borrowers vs total loan size, suggesting that men on average take out larger across all five regions (figure 1.3).

Deposit-taking and GLP are largest in Latin America, an emerging region with comparably strong microfinancial infrastructure, and a longer history of modern microfinancial activity than most other regions (figure 1.4). Eastern Europe is one of the smallest regions in terms of number of borrowers (figure 1.1), but one of the largest in terms of loans and deposits extended by microfinancial institutions (figure 1.4).

Figure 1.4: % of Deposits and Loans per Region, 2004 - 2015
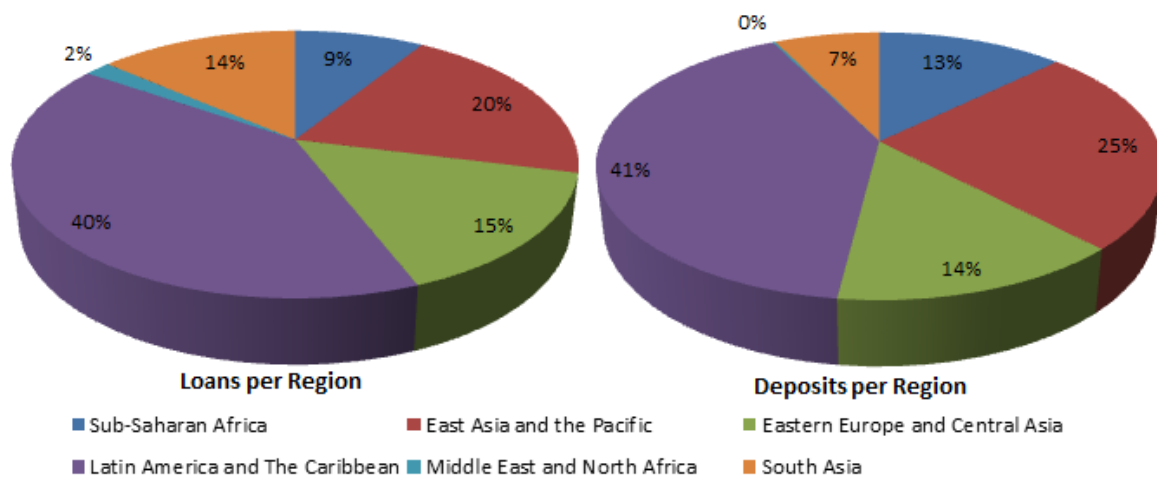
There is some disagreement as to whether consumer loans (to salaried consumers as well as micro-entrepreneurs) also fall under inside the microfinancial bracket. The EU specifically excludes consumer loans and defines microcredit or micro loans as loans up to 25,000 euros, strictly for self-employment or small business ventures (EU Expert Group to the EC, 2007:7). Some voices within the microfinancial sector agree, citing in particular the risk of perpetuating the over indebtedness of MFI clients (Eitzen, 2014; Etzensperger 2013; Hulme 2000) and advocate the development of a framework for identifying 'good' consumer loans such as school fees and health care, from the 'bad' or 'unneeded' forms of consumer loans (Rozas 2012; Schicks 2010). Other research, such as Banerjee and Duflo, argue that microcredit can be seen as just another form of disciplined microsaving, if traditional and

reliable options for saving through deposit-taking is unavailable (Banerjee and Duflo 2007:16).

In practice, most microfinance institutions include a handful of retail loans in their loan portfolio, of which some are long-term with maturities over a year (education, life-cycle loans and mortgages), and some which are short- and medium-term consumer-oriented products with maturities of less than a year (emergency, household finance and consumption loans) (Helms, 2006). The distinction made above is important because the scope of microfinancial loan portfolios has a direct impact on the ability of MFIs to create liquidity.

1.2. Definition of Liquidity Creation

In banking literature, the primary functions of financial intermediaries are traditionally identified as risk reduction for investors and liquidity creation for the surrounding market (e.g. Bhattacharya and Thakor (1993), Bryant (1980), Bouwman (2013)). In this thesis, liquidity is defined as the degree to which an asset can be converted into cash, and liquidity creation is the process whereby financial intermediaries transform liquid liabilities into illiquid assets (Ledgerwood et al., 2013; Diamond and Dybvig, 1983). The process is said to 'create liquidity' for the surrounding market, because it transforms the '*ease, time and cost*' associated with providing capital to previously un- and underserved clients in the microfinancial market (Berger and Bouwman, 2009: 3790)[1].

In older literature, the creation of liquidity has been solidly tied to the concept of maturity transformation; the level of created (transformed) liquidity was seen as the 'gap' between liquid assets and liabilities, divided by total assets, and the liquidity levels of a loan was defined entirely by its maturity length (Schaefer and Deep, 2004). However, in more recent theoretical and empirical work, it has been suggested that this approach is too narrow (Berger and Bouwman, 2009). Rather than simply looking at the liquidity transformation gap between loans with different maturities, Berger and Bouwman suggested to consider the

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[1] For discussion of how liquidity creation is calculated in this dissertation, including classifications and weights, please see chapter 4.

ease, time and *cost* associated with an intermediary's efforts to obtain liquid funds to meet customer demands, as well as the *ease, time* and *cost* associated with customers' ability to obtain liquid funds from the intermediary (Berger and Bouwman, 2009) [2].

The provision of microfinance loans to previously unbanked is a prime example of a context where liquidity creation takes place in spite of the lack of maturity transformation. Due to their inherently small sizes, microfinance loans would be considered liquid in Deep and Schaefer's model (due to maturities typically being shorter than 1 year), but the lack of ease and high potential cost associated with the liquidation of a loan. Given the lack of collateral and underdeveloped financial infrastructure, microfinance loans are therefore considered highly illiquid, using Berger and Bouwman's estimation (Berger and Bouwman 2009; Bouwman, 2013)[3]. Thus, the general hypothesis is that liquidity is created for the surrounding microfinance market, because the MFIs' risk reduction processes and liquidity transformation enables the extension of loans to formerly unbanked clients, which were previously thought too risky.

In financial literature focusing on developed financial markets, liquidity creation is measured in what several studies call "normal, healthy commercial banks", which excludes banks with negative equity, no outstanding loans and assets below $25M (e.g. Berger and Bouwman, 2009; Pana, 2010; Pungacova, 2010; Horvath et al., 2014; Fungacova, 2015. In the case of microfinance and developing financial markets, a similar definition is used, though only excluding financial institutions with GLPs below $1000.

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[2] In microfinance, the types and scale of institutions involved in microfinance are very diverse, and the institutional framework and size has impact on the liquidity created for the market. Differences in scaled LC between traditional and non-traditional liquidity creators, as well as between MFI types within the industry, are discussed in further detail in sections 4.5 and 4.6.

[3] Please see appendix A for a table of liquidity classifications in Berger and Bouwman's paper (2009). For further details on its empirical use and microfinancial classifications, please see chapter 4.

1.3. Motivation and Contribution

Empirical research discussing the impact of micro loans and savings on household income and poverty levels abound.[4] While there continues to be widespread debate about the accuracy of the methodologies used to measure micro-level impact, the general consensus is that microfinance institutions (MFIs) at this stage have proven their ability to remain financially self-sustainable.[5]

However, while a lot of attention has been paid to microfinance's ability to fulfil a host of stated social goals, from poverty reduction to female empowerment and job creation, the financial debate has centred primarily on the micro-level. The vast majority of current quantitative impact evaluations of microfinancial initiatives focus exclusively on microeconomic factors. However, conventional bank theory has continuously highlighted the macroeconomic importance of financial intermediaries to create liquidity and transform risk, ever since Adam Smith first described the need for banks in 1776 (Manchev, 2009). It is only recently, however, that empirical assessments of liquidity creation have begun to surface, and they are still quite sparse.[6]

With a few notable exceptions, the macroeconomic impact of microfinance remains understudied, and none of the existing research seeks to evaluate the ability of microfinance institutions to act as liquidity creators.[7] The institutional meso-level has so far been investigated using either traditional performance parameters such as return on assets (ROA), bank risk with portfolio at risk for 30 days (PAR30), or sustainability measures such as operational and financial self-sustainability (OSS and FSS).[8] While these are all important indicators of *internal* financial performance, they say very little about the institution's *external* financial performance, or whether the institution is fulfilling its role as financial

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[4] See, for example, Robinson (2001), Morduch (2002), Odell (2010), Orso (2011).

[5] Examples of these are Odell (2010); Agha and Ojoko-Okello (2004); World Bank (2007); Hermes and Lensin (2007); Hulme (2000); Simanowitz (2001); Karlan (2007).

[6] See in particular Berger et al., (2011) and Schaefer and Deep (2004).

[7] Buera et al. (2012) provide a quantitative assessment of microfinance's aggregate and distributional impact on macroeconomic indicators such as output, capital, TFP, wages and interest rates. Kaboski and Townsend (2012) look at the general equilibrium effects of village banking on wages and interest rates. Finally, Ahlin and Jiang (2008) provide a theoretical framework for the conditions under which microfinance may create macroeconomic development.

[8] See, for example, Buera et al. (2017); Doci (2017) ; Ahlin et al. (2011)

intermediary for the market as a whole. ROA is a problematic measurement of mission success in a sector where a significant portion of its players are non-profit institutions. OSS and FSS are both good indicators of an institution's internal financial health, but say little about its ability to successfully extend loans to the previously unbanked: an overly risk-averse institution may for example have strong OSS/FSS and PAR30 ratios, but create little liquidity for the surrounding market, because very few loans are given in the first place.

The measurement of liquidity creation presented in this study addresses this issue, and provides first insights into how much liquidity is created by microfinance institutions, as well as what drives the liquidity creation. These answers will help academics, practitioners and policy-makers evaluate the extent to which an individual or cluster of microfinance institutions fulfil their roles as financial intermediaries and bridge the gap between investor and client. There currently exists no other research which attempts to provide theoretical or cross-country empirical measurements of liquidity creation, or of MFI ability to fill the macroeconomic void of standard banks in times of financial crisis. Some research indicates a high and positive correlation between microfinance and the ability of micro-businesses to absorb shock (Gonzales, 2007 and 2011; Oloyombo 2013), but the research is fairly new and scarce. In looking primarily at the profitability of microfinance institutions through history, Constatinou and Ashta (2011) find that MFIs have been better than conventional financial intermediaries at surviving financial crises, though they do not comment on their macroeconomic impact specifically.

Data is drawn primarily from the MIX database and is used to explore a range of relationships between liquidity creation (LC) in microfinance and its drivers. A formula based on current bank literature is developed and adapted to the unique microfinance context. The primary drivers of LC are identified, from an array of traditional finance variables, as well as specifications uniquely important in development markets in general and the microfinance sector in particular.

Each of the questions sought answered in the dissertation's 3 empirical essays are plucked from the current microfinance debate, while still relevant to the overarching theme of liquidity creation. As mentioned above, the essays provide some first insights into the level of liquidity created by microfinance institutions across regions with very different

development profiles, while also contributing to current debates related to the identity and nature of microfinance, its institutional impact and the effects of regulation on microfinance performance.

1.4. Notes on Limitations and Delimitations

While findings in this thesis can provide researchers, practitioners and policymakers alike with some much needed guidance with regard to the nature of MFIs and their ability to perform as financial intermediaries, it is important to note that the study has a number of limitations to consider.

1.4.1. Dataset Concerns

The dataset used in the study is provided primarily by the MIX database, which is the largest publically available dataset collected in microfinance, has historically been under continued critique for lack of reliability. The criticism stems from the fact that the database originally arose from purely self-reported data, and was notorious for its poor data quality.

Despite the data concerns, the database remains the primary source of data for most research done in microfinance, and by far the majority of top-tier papers on microfinancial topics in journals of development economics and finance, have used and continue to use the database. A small sample of these are Cull et al., 2011; Morduch, 2011; Hermes and Lensink, 2011; Bogan, 2012; Mersland, 2009; Conning, 2011. About 90% of the peer-reviewed microfinancial studies in this dissertation use MixMarket data either exclusively or in combination with other data sources.

However, over the years, the data has been cleaned extensively, and this dissertation limits the data used to verified financial data, in MIX marked as diamond levels 4 and 5 (out of 5), which indicates audited financial data. Previous literature does not usually disclose what

diamond level they are using in their study, but those that do refer to it largely use diamond levels 4 and 5[9].

Even so, it is still valid to raise concerns about the data quality. The nature of development research is unfortunately such that available data very rarely reach the quality standards of data from better developed financial markets. It is an unfortunate but unavoidable reality for most academics interested in the development field, but one that will hopefully improve over time.

1.4.2. Calculating Liquidity Creation

The calculations of liquidity creation build mainly upon new literature from Berger and Bouwman (Berger and Bouwman, 2009; Bouwman 2013). They suggest that maturity transformation is inadequate as sole determinant for the level of liquidity created, especially in sectors, such as microfinance, where maturities are inherently short, due to the size of the extended loans. It is currently the best empirical alternative to Deep and Schaefer's 2004 calculations of the maturity gap; a method both inadequate for an industry such as microfinance, as well as inappropriate due to data limitations (Schaefer and Deep, 2004).

There is a reasonable argument to be made against the Berger and Bouwman theory that institutions not taking deposits also create liquidity through asset allocation and funding of illiquid assets previously deemed too risky. This dissertation specifically looksat deposit-taking microfinancial institutions, in an effort to evaluate how MFIs perform when the liquidity transformation taking place is calculated the same ways as in non-developing financial markets. As the results in chapter 4 (specifically table 4.5) show, the average ratio of liquidity creation to total assets through the years is higher in microfinance institutions than in developed financial institutions (as given in studies by Berger and Bouwman, 2009 and Horvath et al., 2014). Regardless of this, however, there is certainly reason to argue for

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[9] 2 exception to this are Bogan (2012) and Gwasi and Ngambi (2014), who use diamond levels 3-5. Neither study discusses the inclusion of level 3 further, but it is likely due to constriction on amount of available data. Examples of studies that do mention using only diamond levels 4 and 5 are Tchakoute-Tchuigoua (2010) and Ahlin et al. (2011).

further studies in liquidity creation in microfinance, where non-deposit-taking institutions are considered through asset allocation[10].

1.4.3. First Insight

Finally, the study is the first of its kind in microfinance, and while it provides a first look at correlations between levels of liquidity created by MFIs and their drivers, there are very likely influences that have not been considered here. A much wider range of possible drivers, both social and financial in nature, such as the impact of national and organisational culture, ownership structures and funding structures, deserve additional attention.

1.5. Dissertation Layout

The overarching theme of the dissertation is liquidity creation in microfinance, and though the thesis is quantitative in approach and methodology, its build is deductive. New generalised theory from traditional banking literature is used to form a test of hypotheses related to LC in microfinance, by exploring a range of unique industry conditions. Epistemologically, the subsequent discourse developed between theory and data has been more of a hybrid approach than purely deductive or inductive, but I have still chosen to provide an overarching introduction to the history, development and theory of microfinance, before diving into the specifics of the observed data.

1.5.1. The Creation and Development of Microfinance

Following the overall introduction to the field, a broader framework for the industry is provided, as well as a historical backdrop for the sector, to which most of today's actors are anchored. The chapter outlines the development of the microfinance industry from antiquity to today. The analysis of today's conditions identifies 4 key areas of discussion in current research, each of which forms a section of the following literature review.

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[10] For further discussion of this, please see perspective and future research in chapter 7.

1.5.2. Trends in Microfinance Research

The overarching literature review presents the main themes currently at the forefront of the microfinance debate, as identified by the previous background chapter. The four sections making up the literature review are: identity, methodology, institutional impact and outreach. Each of these is addressed in the following 3 empirical chapters, and key questions from current literature are sought answered.

1.5.3. Empirical Essay 1: Liquidity Creation in Microfinance

A continuous and contentious debate in microfinance circles is whether the very fundamental nature of the industry can and should be more than a social tool for poverty reduction. As the industry sees steady growth in more developed markets, such as Greece and Spain after the 2008 financial crisis, and in the US especially after Hurricane Katrina in 2005, it becomes still more important that we understand the industry's effect on financial markets as a whole. If MFIs are to be seen as more than a development tool, their ability to function as traditional financial intermediaries, becomes increasingly relevant. Ultimately, the ability of MFIs to function parallel to traditional banks should influence how investors, practitioners and especially policymakers view them, and how they choose to regulate their activities.

Essay 1 provides some first insights into the ability of MFIs to perform on par with traditional financial intermediaries. The essay evaluates a range of traditional financial drivers believed to impact liquidity creation, including the presence of deposit insurance.

The results suggest that unit for unit; MFIs can create liquidity on par with traditional financial intermediaries. The calculated levels of liquidity creation in MFIs show that LC ratios, when scaled by size, are consistently higher in MFIs than in most western FIs. The finding is consistent across geographical regions and organisational structures, though it is particularly pronounced in cooperatives, NGOs and rural banks.

Using fixed effects estimations, the study finds a highly significant negative correlation between capital and liquidity creation, which is in line with the findings of previous banking literature. However, little correlation is found between the presence of deposit insurance

and levels of liquidity creation, and where vague correlation is found, it is positive, unlike the assumptions made by literature, expecting banks to withhold effort when the risk of bank runs is diminished (e.g. Diamond and Dybvig, 1983; Diamond and Rajan, 2001). Similarly, the relationship between bank risk to LC was also mostly insignificant, and where correlated, it was negative, rejecting the notion that high-LC MFIs are creating more liquidity through undue risk-taking (Berger and Bouwman, 2009; Berger, 2011; Bouwman, 2013).

1.5.4. Empirical Essay 2: Drivers of Liquidity Creation

While the results presented in essay 1 suggest that MFIs can produce liquidity on par with, and often in excess of, traditional intermediaries, the results also question the impact of a number of financial variables that literature has suggested may be correlated with liquidity creation, such as deposit insurance, bank risk, age and size. Based on these results, it is plausible to assume that certain conditions which are unique or of particular importance in development and microfinance exert such impact on levels of liquidity creation (LC) that they counterbalance the impact of other more traditional variables.

The second essay investigates a range of financial and development-specific drivers. Of particular interest is the impact of joint lending methodologies, which in literature is often listed as one of the primary risk-reducing strategies employed by the microfinance industry. The results show a strong, positive and consistent correlation between both specialisation and the use of joint lending methodologies, and levels of liquidity creation.

1.5.5. Empirical Essay 3: Regulation and Liquidity Creation in Microfinance

From a policy perspective, the impact of regulation and supervision on MFI performance is one of the most important, but also one of the most contentious current debates. Depending on the ideological perspective, the view on macro, meso- and microecnomic state interference in market activities varies widely from study to study.

However, if policymakers as a whole are interested in a prosperous and well-functioning microfinance sector, a deeper understanding of the relationship between the regulatory framework and performance indicators is needed. This is particularly important in the case of liquidity creation, which is measured in an attempt to gauge the individual institution's ability to perform as a financial intermediary for the surrounding market.

In Essay 3, a two-tiered approach is used to study the effect of regulatory and supervisory frameworks, using MIX, World Bank and IMF data in cross-country and regional estimations, with country-level fixed effects. The results suggest a consistent, strong and positive effect of regulation, across very diverse areas, in terms of both formalised financial frameworks and levels of development.

1.5.6. Conclusion

In the final chapter, the findings of the previous chapters are summarised, and their implications for policymakers and practitioners are discussed. Finally, areas needing additional research are identified and outlined.

2. The Creation and Development of Microfinance

While microfinance has gained footing as a legitimate approach to poverty reduction, notably in the last 40 years, the provision of microcredit as a tool to eliminate poverty is far from a modern invention. The creation of microfinance, both as a way to reduce poverty and as a sustainable and profitable financial approach, is often mistakenly believed to be the creation of Nobel Prize winner Muhammad Yunus's Grameen Foundation in the 1970s.[11] However, examples of microfinancial activity have existed as far back as antiquity.

The exact beginning of microfinance is hard to pin-point, because the roots of the industry are as diverse as the institutions engaging in microfinance today. The revival of microfinance within the last few decades has followed the same paradigm shift as the general development discourse, but both the informal and organised extension of micro-credit has been a way for poor and marginalised to gain access to funds since antiquity. Understanding the many and diverse historical roots and ideological perspectives which have impacted the development of the microfinance concept, thus becomes key to understanding the many approaches to and opinions on, microfinance today.

This chapter outlines the development of microfinance, from the extension of both informal and formal microcredit in antiquity, to its modern revival as poverty alleviation tool and niche financial market. The aim is to understand the many and varied branches which together form the modern microfinance tree, and to show how history may help provide insight into some of the challenges and pitfalls still facing the industry today.

The final section looks at the status quo for microfinance sector, and identifies the four main trends in current microfinance research. The same four categories form the structure of the following discussion of current microfinance research.

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[11] The assumption is repeated by, among others, Milford Bateman et al (Bateman, Sinković, and Škare, 2012), The International Fund for Agricultural Development (IFAD, 2004), and the New York Times (Malkin, 2008). Other sources, such as the Milana and Ashta (2012) and World Bank (World Bank, 2007) mark the 1970s as the beginning of 'modern microfinance', though the reason for the distinction is not fully defined.

2.1. Microfinance in Ancient Rome

Some of the earliest known examples of microcredit provision can be traced back to ancient Rome. The emperor Augustus placed state income from the sale of confiscated property, previously owned by prisoners of war and criminals, into a fund, which provided loans to the poor. The loans were interest-free, but required collateral; the lender had to pledge values amounting to twice that of the amount borrowed, before the loan could be dispensed (Sartain, 1940; Cheong and Sinnakkannu, 2012). The loan system was continued by Tiberius, who expanded the scheme to include larger sums of capital, to be repaid in two to three years, which still required securities of twice the value of the loan (Weber and Musselhoff, 2013). The emperor Severus Alexander decreased the market interest rate on lending, by providing a form of subsidized lending to poor free men, sometimes at below market rate, but also at times, interest-free. The loans were given for the purchase of agricultural land, and repayment was taken from the produce grown on the lands by the lender, much like seasonal microcredit schemes today (Weber and Musselhoff, 2013; Gilbart, 1837).

Under Roman law, women were excluded from all banking and lending business in the antiquity. They could not be involved in legal monetary transactions without the permission of a male guardian, usually the husband or father (Lázaro, 2009; Gardner 1999). However, according to recent studies of inscriptions found in the Pompeiian house of A. Granius Romanus and waxed wooden tablets found at Murecine near Pompeii, the women of ancient Rome had found a way around this exclusion, leading to one of the earliest known forms of informal microlending. They set up informal credit contracts for very small amounts of money, typically extended by women to other women (Panetta, 2004). The loans were guaranteed by pledging agreements for personal items – in one case, a female lender extended small loans, typically between 15 and 20 denarii, to other women at interest levels ranging from 3% monthly to 45% annually. The loans were guaranteed through the pledges of smaller personal items, such as earrings and coats (Lázaro, 2009).[12]

Unlike other lending or borrowing activities, these could be done without the need for the approval of a male guardian; Lázaro proposes that this was possible due to the transactions

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[12] The loans were endorsed with 'pignus-pawns', in which personal items such as jewellery or clothing, were pledged as collateral (Lázaro, 2009).

being 'res nec mancipi', freely exchangeable, and thus, did not have to live up to legal requirements.[13] Additionally, as the deposited amount was the capital of the pawn broker, the loan may have been a form of irregular deposit, which would only create obligations for the deposit taker. This way the lender would also be able to legally avoid the required presence of a male guardian (Lázaro, 2009).

The tablets show that despite the formal exclusion from banking activities, women found a way to bend the system to gain access to capital. Given the constant resurgence of war, it is perhaps not so surprising that women sometimes became a necessary and active part of the business environment: it was necessary to keep trade and production going.[14] Microloans between women enabled the mobility of small amounts of capital. These were often extended by wealthy women to other women who could not obtain credit through traditional means, either due to not having the required collateral or lacking the permission of a male guardian (Lázaro, 2009).

While non-interest loans were provided by the Roman state and versions of informal finance similar to that of microcredit were practiced among Roman women and slaves, the first well-documented examples of organised, non-state micro lending and pawn broking took place across the world in China.

2.2. Medieval and Renaissance Pawn-broking

Outside of Europe, some of the earliest attempts at non-state provision of micro-loans can be traced back to larger monasteries in 4th and 5th century China, which engaged in both pawn broking and moneylending (Woloson, 2009).

During the Southern Song Dynasty (960 – 1279), the capital was moved to the city of Huizhou, causing a boom in construction and the start of a flourishing trade sector. This was further strengthened when the merchants began forming partnerships with nearby

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[13] Res nec mancipi in Roman property law is one of two categories defined by Gaius. Res mancipi means property of particular importance (such as house, slaves, land), which may only be traded or transferred formally. Res nec mancipi is the opposite, ie. trade or transfers less important and thus not covered by formal requirements (De Zulueta, 1946)

[14] In Roman Egypt, where the most comprehensive records of the demographic conditions of the time can be found, an estimated 60% of women were widows by the time they reached their 40s (Gardner, 1999)

monasteries to open pawn shops, allowing them to avoid paying a number of property taxes from which the monks were exempt, and causing the region's economy to further accelerate (Walsh, 2010). These moneylending practices generally used capital from the 'inexhaustible treasuries' of the monasteries, known as 'wujinzang', and were often given without collateral or other guarantees, because the threat of divine wrath, should the loan not be repaid, ensured timely repayments (Walsh, 2010).

In Europe, the spread of pawn broking really began in northern Italy in the early 1400s. The budding Renaissance brought both prospering trade as well as increased poverty in the lower classes. The Catholic church prohibited making a profit on lending, so monks of the Franciscan order, founded upon a vow of poverty, suggested the creation of charitable pawn shops, where pawn-based lending could be performed, and provide an alternative to more usurious moneylending practices (Helms, 2006).

In 1450, the Franciscan monk Barnaba Manassei started a 'monte de pieta' in Italy's Perugia. The institution extended interest-free loans, secured with pawned items. The borrower could typically get up to two-thirds of the value of the pawned item, and initial loans could not exceed 25 lira for clients from the city, and 10 lira for rural clients (Weber and Remer, 2011).

While the Catholic Church initially forbade charging interest on lending money, it allowed taking collateral (Weber and Remer, 2011). Non-charitable pawn shops could thus lend money using a contract which sets the 'fine' for not fulfilling the terms of the 'interest free' loan. They could also restructure the repurchase by the borrower so that interest actually was charged, having been built into in the new price. In practice, the one requirement for entering the financial sector in the Middle Ages was the ability to read and write. Since knowledge of bookkeeping was usually kept within families, the skill only spread slowly across Europe. This caused a significant difference between the Jesuits and Jews who had access to this knowledge and those who did not, causing those two religious groups to have a major impact on the development of the European financial system in the following centuries (Weber and Remer, 2011).

Pawn shops spread quickly across Italy in the latter half of the 1400s, and by 1470, 40 pawn shops existed across northern Italy alone. In 1515, Pope Leon X gave his permission for

pawn shops to charge interest, to cover their costs, causing a dramatic rise in shops across Europe (Walsh, 2010; UNCDP and UNDP, 2009). By the early 1600s, pawn shops had opened in Augsburg and Nuremberg, as well as Amsterdam, Ghent, Antwerp and Brussels (Weber and Remer, 2011).

In the mid-1600s, the Bank of England created the first comprehensive guidelines for pawn-broking, but it was not until the 19th century that an official legislative framework was passed by the British Parliament. The Charitable Corporation, which was founded in 1707, lent funds to poor households, using small pledges and interest to ensure repayment and financial sustainability. Up through the 1700s, the organisation became the largest in England. However, extensive fraud and lax lending procedures caused the organisation to begin bankruptcy proceedings in 1731, which were not concluded until the late 1740s (Weber and Remer, 2011). The reputation of the pawn-broking industry continued to decline up through the 1800s, where the so-called 'dolly-shops', a form of unlicensed pawn-broking operation known for charging usurious interest rates, became synonymous with the trade. The resulting general negative opinion led to the Pawnbrokers Act of 1878, in which interest rates were tightly regulated, along with the duration of loans (Weber and Remer, 2011).

2.3. Microcredit during the Enlightenment: the Irish Loan Fund

In Europe, the first formal and large-scale use of collateral-free microcredit as a direct means to reduce poverty took place in Ireland in the early 1700s. In 1720, Dean Jonathan Swift, author of *Gulliver's Travels*, founded a £500 pound charitable lending foundation, intended to provide small loans to poor Irish tradesmen and farmers, who were experiencing rampant poverty at the time (Jackson, 1940:10).[15] The loans were without collateral, and instead employed the guarantees from a minimum of two neighbours, who would be notified in case the borrower failed to make the repayment. The system of social

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[15] Hollis and Sweetman note the resemblance between the beginning of the Irish Loan Funds, and the 'rebirth' of modern microfinance in Bangladesh, where Mohammad Yunus, like Swift, used his own funds to initiate a loan scheme specifically aimed at poor clients without previous access to capital (Hollis and Sweetman, 2001: 295)

pressure resembles that still used to ensure repayment of microfinancial group loans, which are typically the smallest form of microcredit provided, and where a smaller group of people all are responsible for the repayment of the full loan (Sweetman, 1996). The loans provided were £5-10, and were typically repaid in weekly instalments of between 2 and 4 shillings (Hollis and Sweetman, 2001). According to Hollis et. al, the system was a success, and Swift suffered no losses. The practice was repeated by other charitable investors, of which the Dublin Music Society is an example, who by 1768 had provided 5290 loans to needy clients (Hollis and Sweetman, 2004).

The famine of 1822 drew attention to the needs of the poor and considerable charitable donations were established, of which a sixth of the funds remained when the famine ended. These surplus funds were gathered into the Irish Reproductive Loan Fund Institution (RLFI), emulating the Dublin Music Society. The fund put in place a system which prohibited salaries or profits of any kind to its managers, in an attempt to prevent this moneylending from becoming just another speculative venture (Damme, 2011; Hollis and Sweetman, 2004). In 1823, legislation was passed that allowed the charitable funds and societies to charge interest, and exempted them from paying stamp tax.[16]

The stamp tax exemption made the funds preferred to standard banks and moneylenders, effectively removing 2% of the lending cost. Additionally, the provisions effectively gave the charities property rights over the assets of a defaulter, strengthened their enforcement mechanisms and enabled the charities to accept deposits at interest (capped at 6% by the state) and lend the proceeds at a profit (Damme, 2011; Hollis and Sweetman, 2001:297-303), vastly expanding the funds' capital.

This change in legislation led to a massive expansion of privately-funded charitable societies and funds up through the 1830s, and enabled these initiatives to stay profitable. The Irish state passed laws which introduced the Loan Fund Board, intended to keep a regulatory eye on the more than 500 funds existing in 1840, and attempt to keep ever-growing concerns of corruption and sloppy management of funds under control. By 1848, the RLFI ceased to

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[16] According to Hollis and Sweetman, the maximum interest rate payable by borrowers permitted was initially 13,6%, reduced to 8,8% in 1843 (Hollis and Sweetman, 2001: 303). In comparison, loosened usury laws from 1786 allowed pawnbrokers to charge up to 30% in interest.

exist, its funds having been depleted and heavily burdened by rampant corruption (Sweetman, 1996).

At the height of their existence in the 1840s, the Irish loan funds serviced as much as 20% of the Irish population (Hollis and Sweetman, 2001: 300). The massive demand for access to credit for the poorest in society, still ignored by the standard banks, combined with the funds' ability to charge interest, enabled the societies to accumulate substantial profits.

With the exception of now being able to charge interest, the Irish Loan Funds did not develop much in terms of how the loans were distributed; the procedure by the mid-1800s still followed those set in place by Swift in the early 1700s: a loan taker was still required to have two co-signatories, and pay back the loan in weekly instalments, typically over a 20 week period (Hollis and Sweetman, 2001).

Despite continued demand, the latter half of the 1800s saw a dramatic decline in number of funds and borrowers serviced. Sweetman and Hollis offer 3 key reasons for the decline:

1. The funds were directly dependent on favourable state legislation, which controlled the framework in which the funds were allowed to determine their interest rates, management salaries and payment procedures. With the introduction of new legislation in 1843, which reduced the permitted interest rate that the funds could offer from 6% to 5% and maximum rate payable by borrowers from 13,6 to 8,8%, the operating margins of the loan funds narrowed from 7,6 to 3,8%. According to Hollis and Sweetman, the forced reduction was primarily political, brought about by what was perceived as undue competition with regular banks for small loans (Hollis and Sweetman, 2001: 295).

2. Famine in 1822, and especially the Great Irish Famine from 1845-1852 had a substantial negative effect on the survival of the Irish loan funds. The Great Famine caused an excess mortality rate and migration, which totalled over 25% of the Irish population, and predominately hurt the poorer classes in society, which were the primary clients of the loan funds. Records show depositor losses of over £10,000 during the famine, and a larger number of the smaller and weaker loan funds perished from the impact of the Famine. However, Hollis and Sweetman note that the real surprise is that many survived, and did reasonably well, despite the very harsh circumstances (Hollis and Sweetman, 2004).

3. Competition increased incrementally from the commercial banks in the late 1800s. Damme argues that the loan funds undermined their own business by developing credit history, which effectively removed their lower tier competitive advantage over the banks and thus made them vulnerable to competition (Damme, 2011). Additionally, the loan funds had another significant advantage over the banks in the 1830s, where the banks still primarily operated in the larger cities, while the loan funds were placed in the more rural areas, and thus knew the local conditions and clientele much better. However, this advantage began to diminish in the 1850s, when an increasing number of rural bank branches began to open.

Sweetman and Hollis also suggest that the loan funds battled the same issues as higher tier agencies, where internal corruption and sloppy lending policies were responsible for the primary losses by the funds (Hollis and Sweetman, 2001). While the Irish loan funds showed that they were able to tackle defaulting loans, widespread corruption and faulty management issues, combined with increased competition, proved too serious to be overcome.

A fourth reason for the decline of the funds is put forth by Eoin McLaughlin, who argues that the failure of the Irish Loan Funds was caused by "…*both regulatory failure and regulatory capture, which in turn was a product of the lack of institutional reform*." (Mclaughlin, 2009:110). The Loan Fund Act of 1843 provided the legal framework for the loan funds for the rest of their existence, despite vastly changing circumstances. Mclaughlin suggests that "…*such institutional stagnation created a niche banking institution located in an ever shrinking niche.*" (Mclaughlin, 2009: 110).

2.4. Microcredit in the 1800s

As the financial system expanded and developed throughout Europe, so did the initiatives put in place to specifically address poverty and inadequate access to adequate credit among lower classes of society. These initiatives took a number of different shapes, from charitable 'friendly societies' operating primarily in Britain, to savings banks and credit unions, all operating with varying degrees of commercial agendas.

2.4.1. Friendly Societies and Savings Banks

The mutual savings banks have their roots in the cooperative movement, which saw its first well-documented consumer cooperatives come into existence in mid-1700s England and France (Bonner, 1970). In the late 1700s friendly societies, which were comprised of people forming smaller organisations for mutual savings, pension, and insurance or banking purposes, were seen as a way for groups of similar religious or trade affiliations, to band together for mutual benefit.

This movement formed the foundation for future mutual savings banks, the first of which was Priscilla Wakefield's small Tottenham Benefit Bank, established in 1804 (Leach and Goodman, 2000). The benefit bank was created to provide a place for the savings of poor women and children in the local area of Tottenham, and to provide pensions or disability support when members grew older. A similar initiative was aimed specifically at children, who could deposit pennies, which later could be used to cover apprenticeship fees and work clothes. The bank required timely deposits, and members would incur penalties if the deposit requirements were not met. The savings earned 5% interest, and once the loans matured, they could be withdrawn without penalty (Maltby and Perriton, 2013). Similar schemes are still used in microsavings schemes, aimed to ensure funds for children's education and school uniforms, which often represent a significant cost and barrier to education (Majid et. al, 2013)

5 years later, in 1810, the Scottish Reverend Duncan formed the Ruthwell Parish Bank, which drastically lowered the minimum deposit entry barriers for his parishioners to open an account. Where the minimum deposit in other banks in Scotland and England at the time was £10, the Ruthwell Parish bank only asked 6 pence, if the client agreed to save a minimum of 48 pence per year, for the following 3 years (Maltby and Perriton, 2013).

Duncan cooperated with a commercial bank, to reach previously unbanked clients, much in the same way that a number of commercial banks today attempt to reach microfinance clients, by working with local SACCOs (savings and credit cooperatives) and other forms of local credit organisations of varying degrees of formality.[17]

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[17] See, for example, the work of the commercial bank CRDB in Tanzania, which employs local SACCOs in rural regions to reach previously unbanked clients (Jensen, 2009).

2.5. Post-WWII Microfinance

In the mid-1900s, the approach to development changed. The period after the two world wars pushed state intervention and the desire to develop socially and financially stable societies. Top-down policy approaches in development dominated, making the governments of developing nations the primary party responsible for ensuring economic and social development (Martinussen, 1997; Milana and Ashta, 2012). Where lending with the aim to reduce poverty and ensure social stability before had been done almost entirely on a micro-level, the approaches to development in the 50s, 60s and early 70s often centred around state-funded initiatives. One of the main examples of this type of lending, and the challenges it faced, was the widespread state loans in Latin America's agricultural sector.

2.6. Latin America's State-Run Agricultural Banks

With the spread of the cooperative idea in the early 1900s, other versions of the agricultural financial initiatives with a similar social agenda appeared. In Latin America, rural intermediaries were initiated in an attempt to modernise the agricultural industry through commercialisation. This was done by increasing investment through better access to credit, and by mobilising idle savings (Helms, 2006). However, unlike the cooperative banks and credit unions elsewhere, these agricultural initiatives were typically owned by government agencies or private financial institutions, rather than the poor borrowers themselves, and over time, most of the initiatives became inefficient and insolvent.

In the 1950s, large-scale agricultural development initiatives run by government agencies, came into existence especially in Latin America. The focus for most of the initiatives was on small, poor and marginalised farmers. The provision of state-sponsored credit and loans at below-market rates was distributed with the intent to increase income levels and the production capacity of the agricultural sectors. In some cases, agricultural cooperatives received concessional loans and re-loaned the capital to their borrowers, at rates well below market level interest (Gonzalez-Vega and Graham, 1995).

The agricultural banks provided both long-term agricultural credits which had been rejected by traditional banks, as well as loans specifically targeting smaller farmers deemed too risky by the commercial banks to quality for a traditional loan.

The banks often received the majority of their capital from international donor agencies, as well as central banks and national, regional and local government agencies. The loans were heavily subsidized, and often extended to clients with sub-par creditworthiness (Gonzalez-Vega and Graham, 1995).

The state-run agricultural initiatives were a dominant development approach up through the 1960s and 1970s. However, as time went by, it became clear that most of the heavily subsidized initiatives were unsuccessful. The agricultural development banks suffered from widespread inefficiency and high levels of corruption, and suffered from quick depletion of their capital reserves due to the below-market lending rates and poor repayment ratios, resulting in extensive credit rationing (Helms, 2006). Additionally, the funds supplied did not always reach the farmers most in need, but instead got funnelled to wealthier farmers with better networks and influence (Gonzalez-Vega and Graham, 1995).

Most agricultural banks became insolvent over time. It was common that banks received numerous recapitalisations and, following name and management change, were allowed to continue operations, usually with equal lack of long-term success. Over time, however, the willingness of donors to invest in the agricultural banks waned, and the financial institutions either closed or transformed into development banks through extensive organizational and financial restructuring (Gonzalez-Vega and Graham, 1995).

2.6.1. The Challenges for State-owned Agricultural Banks

The financial intermediaries were defined by their state ownership, focus on agriculture, NGO status and bank charter regulation. According to some research, a large part of the continuous failure of the agricultural banks stemmed from difficulties associated with the complex nature of agricultural lending, without having the necessary training and tools

available (Gonzalez-Vega and Graham, 1995).[18] Gonzalez-Vega argues that the development of the agricultural banks stemmed from a "…*naïve response to the perceived limitations of credit markers, in the belief that all it took to overcome the extraordinary difficulties of agricultural finance was to get the government involve*d" (Gonzalez-Vega and Graham, 1995).

Other research agrees that state ownership was a key part of the problem, because public opinion and interest forced the financial institutions to adhere to social and political agendas, even if they were in direct opposition to the financial stability and health of the organisation (Binswanger and Deininger, 1995; Bourne and Graham, 1984).

Gonzalez-Vega argues that the state-owned agricultural banks, despite being covered by a reasonable degree of regulation and monitoring, suffered from sub-par financial supervision. This was due to a regulatory framework, which typically was primarily concerned with the social aspects of the lending, and ensuring that the financial institutions lived up to the required caps on interest rates and loan targets (Gonzalez-Vega and Graham, 1995). Because of the banks' ownership structure, the intermediaries were vulnerable to policy-level intrusions, guided by fickle public opinion and a volatile political environment, be it from government or donors.

The high degree of donor involvement in the agricultural banks also contributed to governments using the intermediaries as sources of support for their balance of payments, through foreign exchange and loans, at heavily subsidized rates. This effectively turned the agricultural banks into agents for government and donor alike, and the contracts extended were often high risk in nature. Additionally, some of the credit programs evolved into little more than a tool for fiscal transfers, taking the shape of welfare support rather than a financially self-sustainable bank, resulting in reduced repayment rates and profitability (Gonzalez-Vega and Graham, 1995).

The centralized organisational structures typically present in the agricultural banks, coupled with the highly politicized nature of the contracts extended, led to extensive lack of

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[18] Agricultural lending is vulnerable to issues arising from geographical dispersity, weather volatility and severe market price fluctuations (Adams, 1994).

accountability and proper risk management. Lack of investment in adequate training and technology was widespread, and operational standards and guidelines were vastly dissimilar from program to program, and often lacking in substance. Furthermore, politically incentivised decision-making by managers did not always promote the solutions which served the banks best. This led to undue forgiveness of loans in arrears, as well as a neglect of deposit mobilisation from its customers (Von Pischke, 1991 and Gonzalez-Vega and Graham, 1995).

According to Patten et al., the agricultural banks were created with the borrower in mind as the primary stakeholder (Patten et al., 2001). Implemented policies and practices focused primarily on furthering the interests of the customers of the banks, as opposed to ensuring the long-term financial sustainability of the intermediaries. Because of this, heavy use of subsidised credit was used, and the bank client base was chosen based on social reasoning rather than their ability to repay the loans, or lending history. The political nature of the decision-making process, coupled with the singular focus on customer interest, meant that the agricultural banks displayed a fundamental lack in their grasp of their own operational risk. This is in stark contrast to more depositor-oriented institutions, in which the financial intermediary is primarily concerned with securing the deposits of its customers, through prudent practice and customer assurance. Because of the risk of potential bank runs, the financial intermediaries are forced to seriously consider the repayment capacity of its borrowers, and ensure prudent procedures for successful loan collection (Bryant, 1980 and Gonzalez-Vega and Graham, 1995).

Additionally, moral hazard became a problem, because of the cost of adequate monitoring and the perceived levels of risk associated with lending. With a lending portfolio that is difficult to diversify among borrowers, the volatility of weather and geography cause additional uncertainty for the agricultural bank, leading to monoculture. According to Gonzalez-Vega and Robinson, the key mistakes were the lack of focus on non-farm activities to reduce portfolio risk and insufficient attention to the successful mobilisation of deposits (Gonzalez-Vega and Graham, 1995; Robinson, 2001).

The agency issues facing microfinance institutions in general is likely to have made the situation worse for the agricultural banks, given the large geographical distances between

institution and customers. Monitoring the small farmers and branch staff was costly and difficult. In particular, determining whether threatening insolvency was due to local issues with management or general hardships, widespread corruption and/or subpar lending guidelines, was almost impossible (Gonzalez-Vega and Graham, 1995).

Finally, some research has argued that the state-owned agricultural banks failed primarily due to the implementation of import-substitution strategies, which led to over-taxation on food and non-food commodities, inflation, repressive financial regulations and over-valued exchange rates (see Adams, 1994 and Krueger, Schiff and Valdes, 1991 and 1992). This repressive regulation is suggested to have limited the ability of the financial intermediaries to adequately respond to market changes. Additionally, it inadvertently reduced their efficiency through excessive loan targeting, interest rate control, severe reserve requirements and restrictions on entry into new financial markets (Adams, 1994 and Gonzalez-Vega and Graham, 1995).

Similar convictions were the foundation for the structural adjustment programmes introduced by the IMF in the 1980s, stipulating harsh requirements in order for developing nations to be allowed macroeconomic support from the monetary fund. Most of the agricultural banks fell apart once mandatory privatisation schemes and deregulatory requirements were introduced (Stiglitz, 1998).

2.6.2. Credit Unions

Much like the first mutual savings banks, the credit unions developed from the mindset of the cooperative movement. In the mid-1800s, the first formal savings and credit unions were formed in Germany, by Herman Schulze in 1850, who focused primarily on urban artisans and masters (Macpherson, 1999, McKillop and Wilson, 2011). In 1865 Friedrich Wilhelm Raiffeisen, who became a key influence on the further development of the credit unions, created the first agricultural credit union. The credit union was specifically intended to provide access to capital for rural poor, otherwise wholly dependent on usurious moneylenders (McKillop and Wilson, 2011). Throughout the 1860s and 1870s the movement began to expand rapidly across Germany, as well as the Netherlands, France, Austria, Belgium and Scandinavia. Between 1850 and the start of the First World War in

1914, credit cooperatives had over two million poor and middle-class members, all men (MacPherson, 1999). Like the loan funds of Ireland, the credit unions in Germany also had maximum loans (£50), but with longer term limits, a lower interest rate on loans, and they received deposits as well as paying interest on said deposits. Membership was required in order to take a loan with these societies.

Credit unions began spreading across the globe, including the USA, in the beginning of the 1900s. In 1895, the Priyayi Bank of Purwokerto in Java, Indonesia was founded and, inspired by the German credit unions, the bank was converted to a version of a cooperative bank in 1897. This reorganisation marked the beginning of Indonesian rural banking and formed the foundation of what would become BRI, Indonesia's oldest bank and part of the largest network of microfinance institutions at the time (Robinson, 2001).

The Structure and Aim of Credit Unions

In microfinance, the most common version of the credit union still widely used today is the cooperative bank. A cooperative bank has a structure similar to that of a credit union, but typically targets a more diverse client base than credit unions, which are often trade-specific (Mook et al, 2015). The cooperative bank functions much like the credit union in that it also provided access to capital through membership of the bank, but its ownership structures can be quite diverse and also include external investors, for example in the form of donors, government agencies or private equity investments.[19]

A common trait for both credit unions and cooperatives even today is the usual presence of strong social mission statements. The aim is still to provide access to loans for people without adequate access from traditional sources, and provide the credit and loans at reasonable interest rates (Macpherson, 1999). Today, credit unions and cooperatives still consistently offer savings accounts with higher interest rates and credit at lower interest and fees than most traditional banks (Macpherson, 1999).

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[19] One of the more celebrated MFIs with a structure similar to that of other cooperative banks, is the Grameen Bank in Bangladesh, originally founded by Nobel Laureate Muhammad Yunus. In 2008, 94% of the bank was owned by its borrowing members, while 6% was owned by the Bangladeshi government (retrieved from grameen.com.)

For most credit unions and cooperatives, the financial intermediary operates either as a non-profit financial institution, or in the spirit of one (McKillop and Wilson, 2011). The positive net income is used to improve services and reduce costs, or is at times given as dividends to members, as a form of rebate (McKillop and Wilson, 2011).

In credit unions both in and outside the microfinance sector, the members own the organisation, and voting is usually structured after the democratic principle of one vote per member. Board members are typically elected from the member base, as are the participants in other committees and work groups (Wilcox, 2011). The board members of credit unions and cooperatives typically are elected from the intermediary's local community. Thus, a mechanism similar to that present in solitary group loans may keep the board members vigilant in terms of making the best decisions for the community as a whole. MFI cooperatives and credit unions also are likely to suffer from issues similar to that of other NGOs, such as stagnant management, inactive members (e.g. Spear, 2004, Cornforth, 2002). Additionally, some research suggests that smaller credit unions especially suffer from the conflict between performance-maximizing concerns and the board's eagerness to ensure community standing, by optimizing its quality of service (Byrne et al, 2012).

2.7. The 1970s and 80s: The (Re-)emergence of Private Sector Microfinance

The late 1970s and early 1980s saw increased scepticism and scrutiny of the previously so widespread use of subsidized and targeted rural credit, brought about by consistent poor performance and widespread corruption. In addition to sub-standard performance, the programs were accused of high operational costs, insolvency, provision of credit at below market rate to wealthy customers outside the target group, and poor loan recovery rates (Stiglitz, 2002).

The rejection of state-run development programs happened as the general political climate turned in the 1980s, focusing almost exclusively on private sector initiative. A similar change was evident in the development methodologies encouraged and, at times, forced upon

regions across the South. This change had a profound effect on the financial system, and with it, the nature of microfinancial activity (Martinussen, 1997).

State-run initiatives were replaced by the belief that private initiatives in the form of micro-businesses could play a key role in development (Martinussen, 1997). Development policy was now guided by a staunch belief in market principles and heavy liberalisation, evidenced in the structural adjustment programs and the policy-prescriptions of the Washington Consensus (Stiglitz, 1998). The Washington Consensus was a set of neo-liberal principles promoted by the IMF and the World Bank, which strongly encouraged developing nations to eliminate both the import-substitution strategies of the 1950s, 60s and 70s as well as tariffs and to promote deregulation.

In financial development, the state-sponsored methodologies using primarily credit programs targeting poor and marginalised groups, were replaced by a new methodology born out of the neo-liberal principles, called the 'financial systems approach'. This approach was promoted heavily by both the IMF and the World Bank in the 1980s and early 1990s and viewed microcredit as simply another form of financial service, which should be priced freely and according to market principles, to ensure a sustainable and permanent supply, and hinder potential credit rationing (Helms, 2006). The emphasis of the financial systems approach was on the elimination of interest rate ceilings and all forms of credit subsidies, arguing that both hindered natural and healthy development of financial systems and intermediaries. Additionally, it was believed that any sort of state intervention discouraged intermediation, and was claimed to benefit large-scale productions over that of small, local businesses (Martinussen, 1997; Lynn, 2002).

In this climate where development policy turned heavily toward the private sector as the key ingredient in economic growth, the microfinance sector saw a number of innovative initiatives emerge, which in line with the prevalent discourse centred around the promotion of micro-business and private initiative; the most famous being the Grameen Bank in Bangladesh, founded by professor in Economics and later Nobel Laureate Muhammad Yunus (Yunus, 2003). The 'Grameen methodology' distinguished itself by primarily focusing on micro-businesses, and much like the methodology employed by the Irish loan funds in the 1700s, by promoting very small, collateral-free loans, where the members in 'solidarity

lending groups' provided mutual guarantees and social pressure to ensure repayment (Hollis and Sweetman, 2001; Yunus, 2003). Additionally, focus was moved to female borrowers, based on a belief that women would have better repayment rates, and put more funds aside to cover key household expenses, such as funds for education and emergency savings (Yunus and Weber, 2009).

However, the unwavering macroeconomic push of free market principles came under increasingly heavy fire in the late 1980s and 1990s. The approach was criticised for not recognising that a free market is not infallible, and for the hypocrisy of forcing developing nations to remove tariffs and subsidisation of local industries, when both were used extensively in both Europe and the USA (Stiglitz, 2002; Schmitz et al, 2006,). The demands for fiscal austerity, trade liberalization and de-regulation of the capital markets was accused of contributing directly to both the East Asian crisis in 1994 and the Argentine financial crisis in 1998, and for being based on fundamentally unsound economic assumptions (Stiglitz, 2002).

2.8. Microfinance in the 90s and 00s: The Rise of the 'Enabling Environment'

While focus in development continued to be on the private sector up through the 1990s and 2000s, a significant shift towards a more inclusive institutional approach was nevertheless evident, both in development policy as a whole, and in the approach to microfinance. Where the 1980s saw a very uncompromising belief in the market's ability to best create growth and poverty reduction, development research in the 1990s introduced a clear distinction between 'economic growth' and 'economic development' (Lynn, 2002). The private sector was still considered the 'engine of growth', but the need for a strong meso-level was highlighted: institutions and infrastructure were meant to link the macro economy with the micro-level conditions of the poor (Martinussen, 1997). The approach seemed to work, and high repayment rates bolstered by sustainable interest rates allowed MFIs to develop long-term financial sustainability (Robinson, 2001).

As the conditions of the Washington Consensus were scaled down, and the imperfections of the capitalist market approach to development were acknowledged even by economists at

the World Bank (Stiglitz, 1998 and 2002), the emergence of more holistic, all-inclusive approaches to development had a direct impact on the way microfinance was considered. While microcredit was still a key element of microfinance, the range of financial services defined as 'microfinance' began to expand rapidly, to include both microsavings and later microinsurance. Especially microsavings was argued to be as important, if not more, as microcredit to ensure economic well-being, due to its ability to smooth consumption and increase investment (Hulme et. al, 2009).

The growing support for microfinance caused a dramatic increase in microfinancial activity and research in the mid-1990s, and became a favoured tool in the struggle to reduce poverty. It received support from the left for its focus on poverty alleviation amongst the poorest in society, while satisfying the right with emphasis on private initiative and private sector development (Helms, 2006).

The early 2000s saw an explosive expansion of the microfinance sector. Scepticism slowly waned in favour of an at times near-euphoric embrace, which culminated around the turn of the century, with Yunus calling for an 'end to poverty' and receiving the Nobel Peace Prize for his work with microfinance in 2006 (Yunus and Weber, 2009; Yunus, 2003).

2.9. The 2008 Financial Crisis

Before the financial crisis took hold in late 2007, most research had only observed weak if any relationship between the performance of microfinance institutions and events affecting national macroeconomic conditions and the international capital markets (e.g. Di Bella, 2011; Ahlin et al., 2010; Krauss and Walter, 2006).

The years from the late 90s up until the start of the financial crisis boasted strong growth, profitability and asset quality for the microfinance intermediaries, across regional, institutional and regulatory divides.   Institutions specialised in microfinance lending appeared, as did new products meant to target localised needs. The assets of the median MFI grew 36%, with borrowing levels increasing at annual rates above 50%, suggesting a decrease in capital asset ratios, but significant increase in levels of liquidity provided for the

market. Median profitability was good, with equity returns at 10%, and low levels of both portfolios at risk (PAR30) and write-offs (Di Bella, 2011).

Its apparent robust ability to withstand external shock was a key selling point for investors in the use of microfinance assets to diversity the risk of investment portfolios[20] (Gonzalez, 2011; Patten et al., 2001; Krauss and Walter, 2009). The reasons usually listed for its robust nature included the lower financial leverage of microfinance intermediaries compared to other financial institutions, and especially the insulation of its client base to changes in formal domestic and international financial market (Gonzalez, 2011; Krauss and Walter, 2009).

Post-crisis, however, some authors suggest that the lack of impact observed is mostly speculative, due to the poor quality and sample size of data available for the time period (Wagner and Winkler, 2012). With the exception of the brief recession of 2001, the data sample available for microfinance pre-crisis coincided with a strong period in the global economy, which was furthermore a time period of diffusion and expansion for the microfinance sector (Di Bella, 2011; Gonzalez, 2011). The high levels of growth were boosted by significant increases in the operational capacity of well-functioning MFIs, and the steep increase in clients and capacity came largely from increased dependency on foreign investment, from both commercial and donor sources (Kruiff and Hartenstin, 2014).

When the financial crisis spread across the globe in 2007 and 2008, the first initial reactions from the microfinance sector was that the MFIs had fared reasonably well, all things considered. However, while the microfinance industry still expanded, it happened at significantly lower speeds than in the years prior to the crisis. Assets increased by 22% and borrowings by 23%, which was 28% lower than the levels recorded from 1998 to 2006 (Di Bella, 2011; Lützenkirchen, 2012). Mean ROE was 5% lower, and both levels of PAR30 and write-off ratios increased.

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[20] For additional discussion of forms of social finance and its ability to address the conditions that led to the 2008 financial crisis, see for example Chapra, 2009 & 2010 (discussing Islamic finance in particular) Krauss and Walter (2009), Wagner and Winkler (2012), Galema et al. (2011), Gonzalez (2007) and Gonzalez (2011).

Research published post-crisis suggests that the degree of impact differed depending on the MFI's level of integration with the traditional financial market, and by the severity of the regional macroeconomic crisis. Some developing and emerging nations were significantly burdened by declining GDP and trade balances, which reduced the repayment capacity of the microfinance borrowers, and made refinancing options for the MFIs harder to come by (Di Bella, 2011). In cases where the microfinance industry had become closely linked with the general financial market, the deteriorating macroeconomic conditions and state of the global financial markets appeared to have more direct and severe consequences for the microcredit intermediaries (Ahlin et al, 2011).

However, even in regions where the link between the traditional financial market and the microfinance industry was weak, the national and international mainstream financial markets appeared to have deeper impact on the level and speed of growth and health of assets in the microfinance industry than previously thought (Di Bella, 2011; Kruiff and Hartenstin, 2014). Wagner and Winkler argue that the microfinance industry displays a pattern of boom and busts increasingly similar to that of the mainstream financial markets, possibly due to an increased inclusion of foreign funding (Di Bella, 2011). Additionally, increased regional competition and rapid market growth also contributed to the deteriorated asset quality and declining rates of growth (Kruiff and Hartenstin, 2014).

Although it appears to be clear that the financial crisis while less harsh to microfinance than to other financial sectors, did weaken the industry, some research suggests that it was not the main cause of the slowed growth and declining asset quality. Kruiff and Hartenstin argues that a combination of irresponsible expansion strategies, resulting from an overflow of capital from over-eager donors and social investors, contributed just as much. The marginal increases in lending in 2006 and early 2007 were of lower quality than previous loans, often larger in size, and extended without the lending standards of previous years (Kruiff and Hartenstin, 2014). In his paper calling for BASEL standards for the microfinance sector, Kruiff and Hartenstin muses on the changes in lending practices, commenting:

"After years of evidence proving the microfinance sector to be fairly resilient to financial crises one wonders what has happened to the sector's risk mitigating traits: conservative credit technology, short-term lending with frequent instalments, clients with flexible informal

businesses, and a market environment where over-indebtedness is not common." (Kruiff and Hartenstin, 2014: 12)

In addition to the findings of Kruiff and Hartenstin and Di Bella, Gonzalez notes that the increased degree of integration of the microfinance industry into the mainstream financial market caused a decline of the microcredit portfolio quality when the macroeconomy was weakened by the economic recession (Gonzalez, 2007). When the crisis began to be felt, the lower lending standards meant higher administrative costs to control levels of delinquency, and the general recession meant decreased access to liquidity funds on the liability side (CGAP, 2010).

Additionally, increased levels of competition had a negative impact upon the dependency relationship between customer and MFI, which a lot of the intermediaries are reliant on. With increased competition, the incentive for a customer taking loans without collateral is less impactful, especially if the quality of available credit registries is still subpar. In an effort to attract new customers, new loan products have increased the cross-over between MFIs and the mainstream financial markets, and through it increased exposure and vulnerability to GDP contractions during the recession.

2.10. Microfinance Today

Today the euphoria of the early 2000s has died down, with the financial crisis issuing a sobering stop to the explosive growth seen both in the number of MFIs emerging and the number of loans extended pre-crisis, especially in the more developed regions, which were closer tied to the formal financial market (figure 2.1). This slowed growth was additionally strengthened by a general decline in available funds for development initiatives, especially in the 3-4 years following the crisis (Figure 2.1; Ngo, 2012:175).

Figure 2.1: Regional Growth by Year, in %
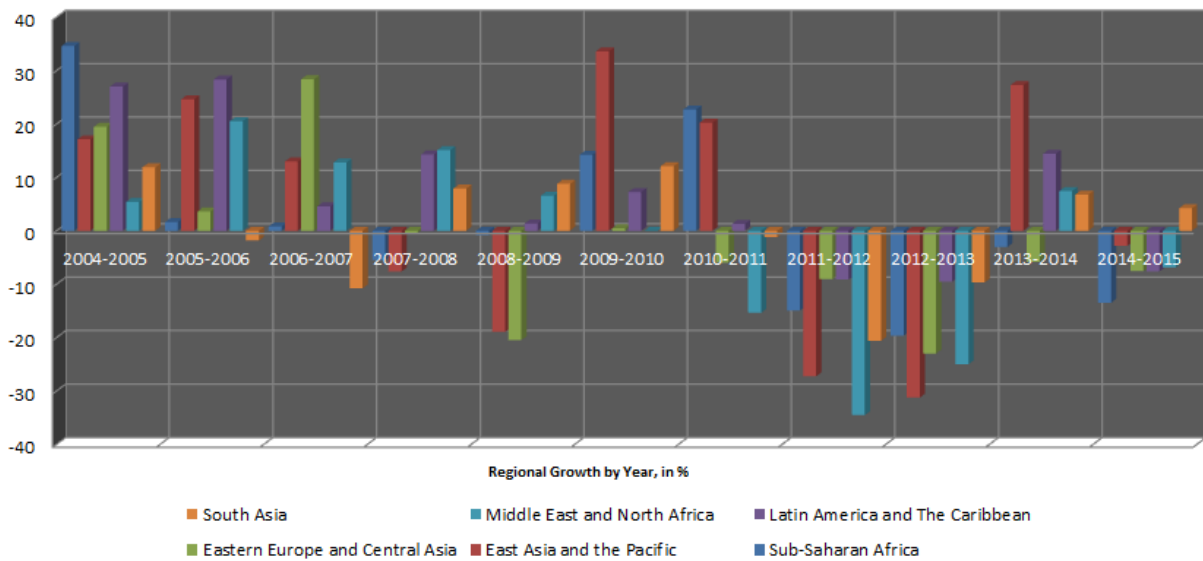
However, despite the slowed growth and dampened euphoria of previous years, microfinance today still appears to be a success. The sector has bounced back, and experienced an average annual growth of 30% in 2017 (Khamar, 2017; Convergences, 2018). Additionally, microfinance lending has seen increased use outside the traditional development context. With the establishment of microfinance as a genuine niche market in finance, the interest in micro-financial activity is no longer strictly reserved for those with an interest in development policy alone (Khamar, 2017).

After the financial crisis in 2009, the EU became interested in microfinancial activity as a possible way to minimise the effects of future financial shocks, and help job creation in regions where rampant unemployment, weak banks and explosive poverty made conventional lending near impossible (EIF 2009:5). According to the European Microfinance Network (2013), over 200,000 loans with a loan volume exceeding €1 billion were disbursed in 2011.

With the addition of the Employment and Social Innovation (EaSI) program introduced in the 2015-2020 budget, an additional €450 million in loan volume is expected. The primary focus of the new budget is job creation, particularly among the youth, and microfinance is presented as a tool for creating and expanding income-generating activities through

improved access to capital (EC and EIB, 2013; European Investment Bank Group, 2011; European Microfinance Network, 2014a and 2014b)

Figure 2.2: Assets by Type by Year, in USD Mn
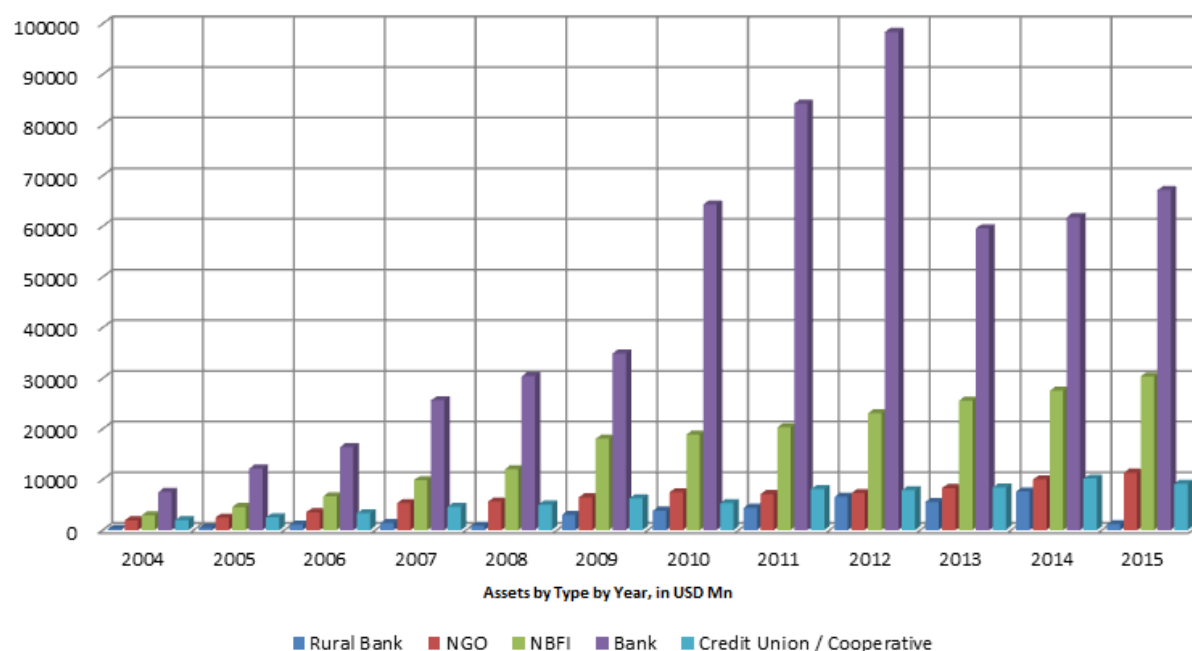
. The increased interest from more well-developed markets and formal financial institutions is directly visible in the asset distribution, where banks now contribute by far the largest portion (figure 2.2).

In addition, the 2010s saw the emergence of 'micro-savings', where the importance of savings both as a means to escape poverty for clients, as as a way for institutions to strengthen their capital base, came into play for many microfinancial strategies (figure 2.1).

The nature of microfinance in the in the EU and the US is different, with regard to both the size of loan and the primary lending practices: where traditional microfinance loans are often $US100 or less, the EU defines microloans as loans of a sum less than 25,000 euros (Murdoch, 2008; European Commission, 2007). The legislation and regulation of microfinance in the developed regions often blends with that of small, formal businesses, and the majority of microfinance providers in both the EU and the US are formal private institutions or the state. The loans given are typically individual, and the regulation of institutions is typically much higher (EIF 2009; EMN 2014a and 2014b).

Figure 2.3: Deposits by type by Year, in USD Mn

Deposits by Type by Year, in USD Mn

■ Rural Bank ■ NGO ■ NBFI ■ Bank ■ Credit Union / Cooperative
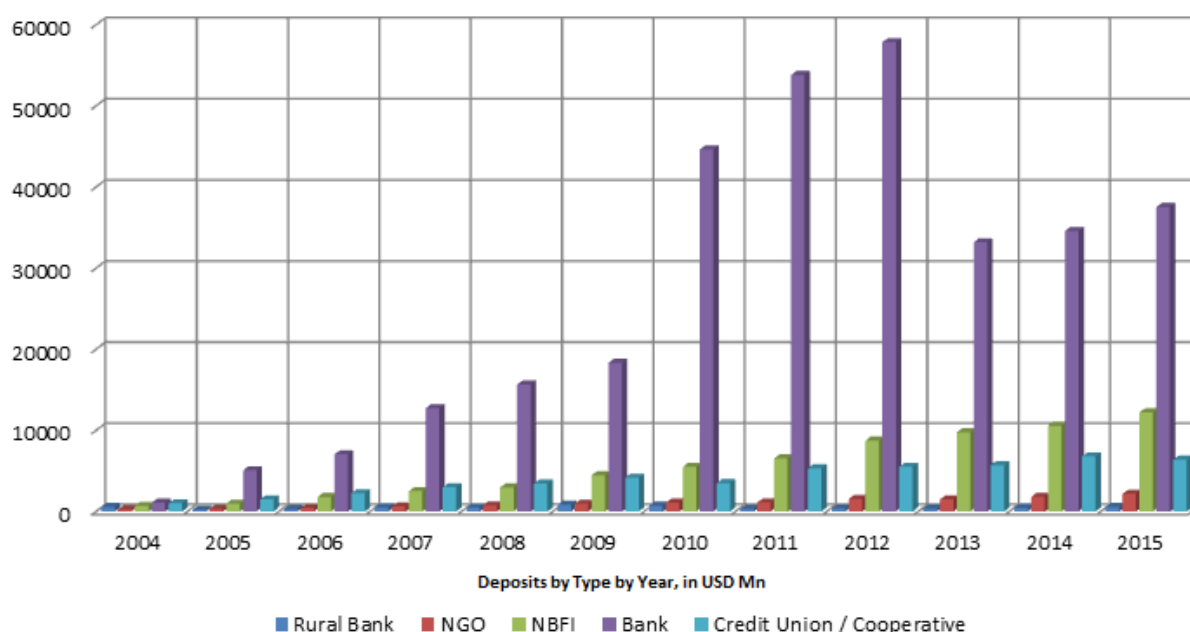
While the differences between developing and developed countries use of microfinance are numerous, there are lessons that can be learned on both sides. Where traditional microfinance initiatives and NGOs argue that the failed financial systems in the EU and US should look to sustainable finance to ensure the well-being of the client, it is also very likely that lessons from microfinance in developed regions may help shed light on the challenges in developing countries (e.g. Yunus and Weber, 2009). A stronger regulatory framework, for example, as well as the challenges facing microfinance in developed financial markets, may help show the way to strengthening the microfinancial industry as a whole.

The debate today is moving away from questions of basic financial performance and client-level impact, to more fundamental questions regarding what the core identity of microfinance is, and with it what role microfinancial institutions should play in the general economy. Within this context of an ever-evolving industry, 4 key areas are currently moving to the forefront of the microfinance debate: a) the identity of microfinance, b) the search for efficient lending strategies, c) the macroeconomic impact of microfinance, and d) the increase of the scale and scope of microfinance. These 4 categories are explored further in the following chapter on recent trends in microfinance research.

Figure 2.4: Regional MFIs, by Year

Regional MFIs, by Year

■ Sub-Saharan Africa ■ East Asia and the Pacific ■ Eastern Europe and Central Asia
■ Latin America and The Caribbean ■ Middle East and North Africa ■ South Asia
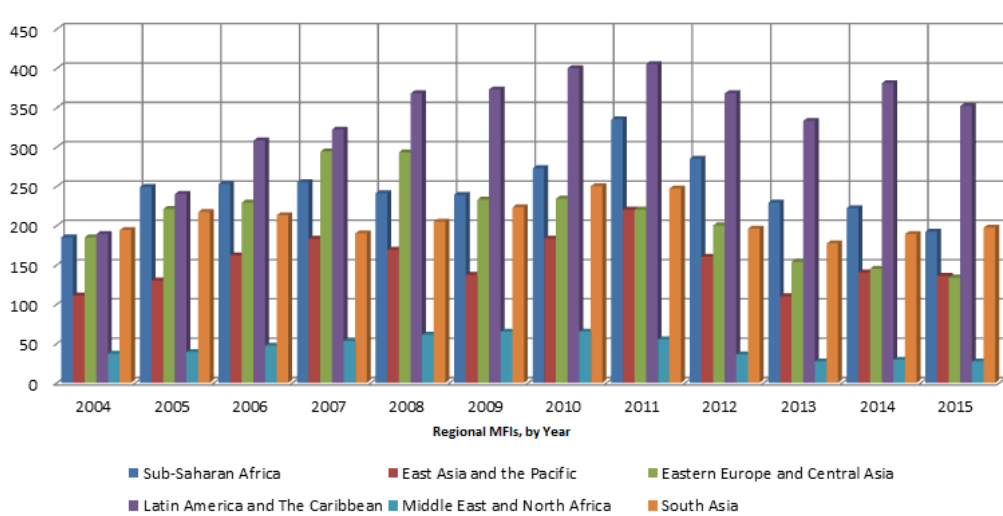
2.11. Conclusions

The roots of microfinance are as many and as varied as the approaches used in the microfinance industry today. Throughout history, the successful extension of micro-credit, and later provision of microfinance, has been dependent on a number of factors.

First, legislative and state intervention needs to be enabling, not hindering. The decline of the Irish Loan System demonstrates what may happen when regulatory failure and imprudent legislation come together to form a strongly impeding context for the further growth of the microfinancial activities taking place at the time.

Second, the role of the state has an undeniable impact on the health of the microfinance sector, regardless of whether said influence is negative, as was the case for most state-owned agricultural initiatives, or positive, as has been the case when the state has successfully created an enabling environment for the industry. Looking at history, regulatory failure and rampant corruption are some of the key threats to ensure the continuous prosperity of the sector.

Finally, post-crisis research indicates that the microfinance industry is slowly increasing its direct links with the mainstream financial market, for both good and bad. The high levels of growth observed since the late 1980s have meant an increase in both scale and scope of

most well-established microfinance intermediaries. The increased size of the microfinance sector has meant higher impact on macroeconomic conditions, both in terms of GDP and as a provider of liquidity to the private sector, which also increases the systemic risk for microfinance.

In the wake of increased political interest from the EU and similar governmental bodies in microfinance to boost job creation and reduce social exclusion, it becomes increasingly important to improve our understanding of the ability of MFIs to function as liquidity creators for the overall economy, in the same way as traditional financial intermediaries.

We need to understand what initial mechanisms made microfinance lending successful where traditional banks were not, and what approaches to microcredit and microfinance have not worked. Additionally, we need to understand the behaviour of microfinance institutions compared to that of traditional banks, especially as the number of traditional institutions entering the microfinance industry increase.

3. Trends in Microfinance Research

As outlined in the previous chapter on the history and development of the microfinance concept, the trends in current microfinance research can be split into 4 main categories[21]: *identity, strategy, impact* and *access*. The following theoretical chapter outlines the key topics of each category.

Studies related to the *identity* of microfinance takes a closer look at its use as a poverty reduction tool, and evaluate both its original framework, as well as the transition of some MFIs from non-profit charities toward more commercial and formal financial institutions. They discuss the presence of a mission drift within the microfinance industry, as well as the key drivers and potential consequences of such a transition.

Research on the *strategy* of microfinance institutions investigate the unique methodologies employed by MFIs to reach previously unbanked clients. The studies look at the strategic alliances sometimes formed between formalized commercial financial institutions and local savings and credit schemes, to reach microfinance clientele. Studies in this category also look at the drivers for successful repayment, and analyse the impact of factors such as gender, age and education of the successful microfinance loan-taker.

Research on the *impact* of microfinance typically moves along two very different paths: the impact of microfinance on the lives of its loan-takers, and the impact of the microfinance industry on the societies and capital markets in which they operate. While microeconomic impact is an area of much debate and activity, there is less research done on the macroeconomic impact of microfinance. For the specific purpose of this thesis, the primary focus in this theoretical chapter is on the *macroeconomic impact* of MFIs, as these impact analyses have a direct impact in MFI ability to create liquidity for their surrounding markets.

Finally, research on *access and outreach* discusses the ways in which to improve the scale and scope of microfinance activity and to increase access for previously unbanked clients. In terms of scale, studies look at the impact of the size and structure of the MFI, as well as

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[21] The four trends were identified through a thorough review of the current, relevant literature in microfinance, as it related to this dissertation.

discuss the poverty range in which microfinance may successfully be employed to reduce poverty. The discussion of scope looks at the lending products offered and identifies the benefits and challenges of portfolio diversification in MFIs.

3.1. The Identity of Microfinance

As microfinance has found increased use and recognition, its spread has moved beyond its original actors, NGOs and donor-financed initiatives, whose primary objective was entirely of a social character. There exists a plethora of individual case-based research studies and a few larger empirical ones, which support the notion that successful microfinance initiatives can provide a financially sustainable option in the struggle to reduce poverty (see, for example Cull et al., 2009; Odell, 2010; Goldberg, 2005; Robinson 2001). However, as the industry grows, the differences between social and financial strategies have become more apparent, and the critique of opposing viewpoints on both sides of the fence is fierce. With increased use has come a move among some microfinance institutions towards commercialisation, and with it, an interest in not just financial self-sustainability, but also the increased profitability of their microfinancial activity (e.g. Carrick-Cagna and Santos, 2009; Christen, 2002; Helms, 2006).

3.1.1. The Compartamos Controversy

The debate, which has raged both in academic and practitioner environments, came to a head, when the Mexican MFI Banco Compartamos went public in 2007. Banco Compartamos sold 30 percent of their holdings, bringing in a net worth of over $US1.6 billion, and from one side, praise for the bank was abundant: The Economist called the bank *"...not the biggest, but the most important Mexican bank"*, and venture capitalist Steven Funk expressed his support for the IPO, stating *"...one must allow and support the development of capital markets to fund the impoverished"*. (Economist, 2007; Cull et al., 2008; Malkin, 2008). A number of academic studies have also supported this transition from non-profit MFI to for-profit mode of operation, noting that relying on deposits and revenue rather than donations is more secure long-term, and these institutions appear to be more cost-effective (Bogan, 2012a; Caudill et al, 2009; Ledgerwood and White, 2006).

However, Compartamos and other microfinance institutions taking a commercial approach, came under heavy fire from the supporters of more traditional microfinance. Yunus stated that Compartamos was "*...on the money-lender's side, not the poor*" (Carrick-Cagna and Santos, 2009), and Chuck Waterfield of Microfin accused the MFI of *"...monopolistic exploitation of the poor*" (Economist, 2008). Critics claimed that the MFI took advantage of its market position, and charged interest rates which were far from a social optimum; close to 100%, allowing the company an average annual return of 53% (Carrick-Cagna and Santos, 2009). The bank was, along with other commercial initiatives, accused of simply substituting one form of loan shark with another (BusinessWeek, 2007). Others agree, arguing that the social impact of microfinance must take priority over full financial return (Grene, 2012). Additionally, some research contends that when commercial microfinance grows but does not raise the interest rate over time, the MFI will exhibit a natural tendency to stop being a microfinancial institution, in order to prevent falling below the profitability threshold (Jensen, 2009). As the organisation grows, overhead costs, transaction costs and shareholder expectations will increase. Consequently, the smallest MFI customers that were once profitable for the organization will over time no longer continue to be so. The smaller clients are considerably more expensive for the MFIs than the larger customers, and the new cost structures and legal limitations that the MFIs experience with growth will prevent the poorest clients from being served adequately. With upward-expanding markets, the low end of the market will be increasingly ignored (Jensen, 2009).

In contrast to commercial MFIs such as Compartamos, the average interest rate lies around 31% among non-profit MFIs (BusinessWeek 2007). However, the non-profit approach has its own set of critics, and its own challenges to meet. Placing primary focus upon poverty reduction, a large majority of the non-profit MFIs fail to keep themselves financially sustainable in their infant and growth stages, and struggle to even survive to maturity: according to Carrick-Cagna and Santos, only 2% of the non-profit microfinancial initiatives are considered self-sustainable (Carrick-Cagna and Santos, 2009).

Some literature holds that it is less a case of argument for or against commercialization, but rather a question of understanding the life-cycle stages that a successful MFI passes through (eg. Helms, 2006 and Bogan, 2012a).

3.1.2. The Life-Cycle Theory

The life-cycle theory considers the nature of microfinance institutions from an institutional evolutionary perspective. It argues that most MFIs change capital structure as they mature, evolving from NGOs in their infant and youth stages, to eventually becoming full-fledged financial institutions in later stages of maturity (Farrington and Abrams, 2002; Helms, 2006; Maisch et al., 2006). Microfinance institutions thus typically start out with a social mission, financing their loan portfolio entirely through grants and concessional loans. Funding comes primarily from donors and international financial institutions, who *"...effectively serve as the primarily sources of risk capital for the microfinance secto*r" (Bogan, 2012a:1047).

The life-cycle theory states that sources of financing are directly linked with the maturity stage of the institution (Helms, 2006), suggesting that both age and organisational type may have significant impact on the levels of liquidity both held and created by the MFIs. Donor grants and soft loans make up the major part of funding at earlier stages of maturity, and eventually develop into more traditional funding in the form of deposits and equity capital (Bogan, 2008; Farrington and Abrams, 2002). In their 2002 article, Farrington and Abrams provide support for the claims of the life-cycle theory, finding that an increase in competition is changing the shape of the microfinance industry (Farrington and Abrams, 2002:5). According to the authors, the leveraging of capital is increasing, with non-profits having an average leverage of 4.5 times the value of their equity, compared to previous levels of 1.3. Additionally, they observe a strong increase in deposits, as well a move away from grants toward commercial funding, though the tendency demonstrates strong regional differences, with Latin America showing the strongest changes (Farrington and Abrams, 2002:6-7).

The life-cycle theory is also supported by the findings of other studies. In their 2007 study of Vietnamese NGOs, Nghiem propose that the degree to which either financial sustainability or social benefits is prioritised depends both on the nature and maturity level of the specific MFI (Nghiem, 2007). An example of this is for-profit MFIs, which in their infant stage often need subsidies from donors to cover initial establishment and operational costs, but in their maturity stage would be expected to sustain themselves with some profit margin. In contrast, the non-profit MFIs tend to start on a lower level of both outreach capacity and

financial sustainability. Priority is typically given to increasing the depth of the services provided, rather than long-term sustainability (Schreiner, 2002; Nghiem, 2007).

In opposition to the life-cycle perspective, some academics and practitioners in favour of increased commercialisation and integration into the traditional financial system, argue against this. Microfinance institutions need to use commercial funding in all stages of development, in order to achieve both social and financial self-sufficiency. The supporters argue that commercial funding and a for-profit approach has a positive impact on both outreach and efficiency (Carrig-Cagna and Santos, 2009; Bogan, 2012a). Since donor grants are limited in both scale (limited amount) and scope (typically only given for one or two donor cycles, spanning 3-5 years), the theory argues that relying on donor grants can have detrimental impact on the operations of the MFI (Armendáriz and Morduch, 2010). Bogan finds support for the for-profit theory in her research, noting that grants and soft loans decrease the operational self-sufficiency (OSS) of microfinance institutions (Bogan, 2012a:1052).

Some recent empirical research argues that the distinction between profitability and commercialisation implies a belief that social and financial goals must be mutually exclusive, which may not be correct. Studies exploring the financial performance of for-profit MFIs and non-profit organisations find evidence that non-profit and for-profit MFIs perform equally well (Lützenkirchen, 2012; Mersland and Strøm, 2008 and 2009), and in some cases provide evidence of non-profits outperforming for-profits (Downey and Conroy, 2010a and 2010b). Supporting these findings, additional research suggests that mature non-profit organisations display increased rather than diminished efficiency (Nghiem, 2007).

Not all research agrees, though: Cull et al. argue that the non-profit and for-profit MFIs have to navigate between a number of distinct practical trade-offs. They find that the NGO median operating costs are roughly double of the for-profit initiatives, and ask whether the NGOs should *"...move upmarket to provide larger loans and improve financial performance"* (Cull et al., 2009: 4).

3.1.3. Why Identity Matters

The debate on the primary nature of microfinance institutions is important, because it is directly linked with how the industry should be seen in relation to the rest of the financial market, and how the state should regulate it. Is it only a development tool, meant to primarily reduce poverty and grant access to finance for clients otherwise not reachable by more traditional financial institutions? Or has it developed into a niche financial market in its own right, functioning as a sustainable and profitable alternative to traditional financial institutions? The distinction becomes increasingly important as microfinance methodology is re-introduced into societies with more developed capital markets, for example in an effort to reach those left behind by the most recent financial crises. Do we regulate MFIs as a social initiative meant to reduce poverty, or as financial institutions embedded in the traditional financial market, on a par with banks and other commercial financial intermediaries? Should the state be allowed to direct or regulate the lending activities of MFIs, in an effort to optimize their social output, even if it happens at the expense of its financial self-sustainability? The answers given depend on the perceived identity of microfinance.

The first empirical chapter of the thesis uses current banking theory to calculate the level of liquidity created by microfinance institutions for the market they operate in, which is considered one of the primary functions of banks from a societal point of view. I do this to shed light on the ability of MFIs to perform like traditional financial intermediaries, and to better understand under what conditions an MFI may be able to contribute to the financial markets, and serve as liquidity creators on par with other financial institutions.

3.2. Lending Strategy in Microfinance

The lending strategies employed by microfinance institutions, both in terms of to whom and how they lend, as well as the alternative forms or complete absence of collateral required, is a key part of what makes microfinance activity different from that of more traditional financial intermediaries. MFIs normally operate in regions with poorly developed financial infrastructure, without well-developed credit registries, and typically extend loans to poor people without access to adequate collateral. Because of this, the MFIs have had to develop

innovative lending methodologies to address the challenges of asymmetric information and of the high risk of adverse selection. These unique lending strategies, comprised primarily of joint liability lending to groups of varying size, enable the MFIs to extend illiquid loans to borrowers that would otherwise have been considered too risky to lend to, positively affecting the liquidity created by the MFI.

Traditional commercial banks typically run into a number of troubles, when extending loans to customers about which they have limited information. This is especially true in developing markets where credit registries are either partially or completely absent, and where banks typically cover very large and diverse geographical areas outside the main cities (Armendáriz and Morduch, 2010). When clients have no loyalty to the financial intermediary in question, and the intermediaries suffer from asymmetric information, the protection against adverse selection is found through the employment of collateral (Stiglitz and Weiss, 1981; Stiglitz, 1990). In addition, some literature argues that the better quality of information accessible to group-lending approaches reduces the price of monitoring for the bank, by taking advantage of the monitoring mechanism among peers within each group (Stiglitz, 1990; Varian, 1990). Before microfinance became reasonably common, the high transaction costs and problems with asymmetric information for traditional banks meant that the poorest and most rural regions were often completely void of any access to financing, unless the borrower was desperate enough to accept the usurious practices and interest rates of informal money lenders (Hermes and Lensink, 2007; Helms, 2006).

In microfinance, joint lending methodologies such as village banking and solidarity group loans, are used to overcome the troubles more traditional banks face without adequate information or collateral. Studies evaluating the impact of joint lending strategies typically discuss four main challenges facing traditional lending to the poor. These four are *adverse selection*, *moral hazard*, *transaction costs* and *enforcement* issues.

3.2.1. Adverse Selection

Issues arising from adverse selection happen when clients have undesired characteristics, which are unobservable by the lender, but have adverse effects on the ability of the client to repay its loan.

Microfinance institutions are able to bypass the intermediary's need for credit rationing due to the risk of adverse selection, by using group loans (De Aghion and Morduch, 2005). Group loans are small loans given to individuals in groups of typically 4-8 people, who share joint liability for the repayment of the loan. In small groups, where borrowers pick their group members, adverse selection is avoided because the borrowers are well informed about the risk-willingness of potential group partners (Ghatak and Guinnane, 1999).

If the group defaults on its loan, all individuals in said group will be excluded from additional lending activity. Default cases are thus reduced because the group members are in a better position than the MFI to screen, monitor and enforce timely repayments, while keeping the MFI costs for same activities down (Hermes and Lensink, 2007). Without the group constellation, loans of same size would be too small to be cost effective, given the high level of risk associated with it (Ghatak and Guinnane, 1999).

The delegation of agency issues from MFIs to its borrowers results in increased efficiency for the MFI. Adverse selection issues are minimised through the reduction of asymmetric information between the borrowers and the MFI, and with it, the risk is passed on from the microfinance institution to the borrowers (Conning and Murdoch, 2011).

3.2.2. Moral Hazard

Moral hazard is the risk that a client will spend their loan in a less than optimal way, making poor choices because the associated risk is shouldered by someone else. When a microfinance client has received a loan from the intermediary, the payoff is dependent on financially prudent behaviour from the client. This includes, for example, the level of effort put into making the financed project a success. Generally, the expectation is that the client chooses actions in which said action equals its marginal cost (Becchetti and Pesani, 2010; Simtowe et al., 2006). However, with asymmetric information and the lack of collateral, the intermediary and loan taker are at risk of not holding same objectives, due to the fact that

the loan taker is not internalising the full cost of potential project failure (Ghatak, 1999). In addition, the intermediary may not know the optimal behaviour as well, since the loan taker's actions are not all observable, and comes with high costs, especially in a development contexts.

The theoretical literature on joint lending strategies and peer monitoring argues that groups are able to take preventive measures and install corrective behaviour in peers, to ward against group members who may mismanage their loan (Armendáriz and Morduch, 2010). This is possible due to the shared liability. The individual group members carry the liability both for themselves and for other members of the group, but the increased quality of the group's decision allows the intermediary to pass on potential benefits to the group to reward good behaviour, for example in the form of lowered interest rates. This, in turn, increases welfare and economic position of the individual client, as well as repayment rates for the intermediary and, subsequently, the level of liquidity created for the market (Ghatak 1999; Armendáriz and Morduch, 2010).

3.2.3. Transaction and Auditing Costs

The effects of joint lending in empirical literature are often studied by looking at its impact on transaction costs. Theoretically, the transaction cost argument put forth in existing literature is that it may be only slightly more expensive to extend and administer a group of loans, than it is extending a single loan. For this reason, group lending allows the intermediary to reduce its transaction costs per loan.

Ghatak and Guinanne (1999) explains that if the characteristics of the loans extended are 'simple and similar' with regard to their repayment procedures and locality, then the intermediary may save processing and screening time, by extending clusters of group loans, rather than individual (Ghatak and Guinnane, 1999). The intermediary can thus avoid costly auditing costs for each potential client claiming low output, by getting group peers to monitor and perform initial auditing. Only when the entire group expresses inability to reach repayment goals, will the intermediary have to perform an extensive audit of the loan agreement (Ghatak and Guinnane, 1999; Hermes and Lensink, 2007).

The challenges related to high auditing costs are directly connected to the instability of the financial markets, in which access to good information on potential clients is hard to come by. Public credit registries are often of poor quality or completely lacking, and because of this, traditional intermediaries must reject loans to poor clients, due to their inability to verify information provided by the loan taker. In addition, the lender is unable to verify the quality of information given by existing clients, who claim they are unable to repay at the agreed upon time. If the information given by the client is true, there are situations where it will benefit the intermediary to accept lower rates of repayment, but it is financially unfeasible for the institution to do so for every client and still break even, thus running into problems with false reporting.

Traditionally, the issue of false reporting and avoiding high auditing costs is solved through a standard debt contract, in which the borrower agrees to pay a fixed fee. The lender in turn agrees only to audit if fee is not repaid in time, causing the borrower to lose their returns (Townsend, 1979; Ghatak, 1999). However, too high costs of auditing may present a situation in which the bank is unable to break even. Ghatak suggests that joint liability lending addresses this issue by reducing expected auditing costs and improving efficiency. Group members face lower costs for verifying the group's output, due to locality and intimate knowledge of day to day activities. Intermediary auditing is thus avoided, unless or until the entire group decides that they will have to default on the loan.

3.2.4. Enforcement

The challenges with regard to enforcement of disciplinary action due to an infraction of a contractual agreement between intermediary and loan taker, is typically not related asymmetric information. Rather the challenges faced by the intermediary in imposing effective sanctions in a typically unstable macro-environment, and against borrowers who often have nothing to confiscate (Ghatak, 1999). In unstable macro-environments, often with weak institutions and poorly developed enabling frameworks, clients may refuse to pay what they owe the intermediary. This might be due to the poverty level of the borrower, or simply because the legal system is not able to instil effective sanctions upon the loan taker (Besley and Coate, 1995).

Some studies argue that joint liability contracts increase the repayment rates for MFIs, by utilising the ability of 'good' borrowers, to cover the losses from bad (e.g. Besley and Coate, 1994 and 1995). However, Besley and Coate also found that borrowers, who perform at a mediocre level in groups, may be at risk of defaulting on their own loan, because of the added burden from having to carry the loan of a bad loan taker. The authors argue, however, that if the social connection between the group members is strong enough, the net effects observed on repayment rates is positive, due to the double threat of sanctions, from both the financial intermediary, as well as the community they belong to (Besley and Coate, 1995). As long as the group holds sufficient 'social capital', the joint liability group is likely to enforce repayment above what is possible for more traditional financial institutions, issuing individual loans.

In related research, it has been found that loan takers will voluntarily agree to joint liability, regardless of whether the terms from the intermediary formally are joint or individual (Armendáriz and Morduch, 2010). Some literature has thus taken a closer look at the ability of joint lending to mitigate issues arising from strategic default. Diagne (1999) develops a model based on peer pressure, in which the loan takers hold incomplete information on one another. They do not know the level of the other group members' willingness to tolerate social sanctions. The author argues that peer pressure only works in contexts, where the bad loan taker cannot tolerate the pressure from social sanctions well (Diagne, 1999). While studying the optimal size for groups, as well as the most efficient structures for monitoring, de Aghion discusses the impact of strategic default. The author proposes a model in which a loan taker's group can verify the level of returns. Based on this, the group is able, at a cost, to impose sanctions upon a defaulting group member, if they default strategically, thus allowing the overall returns of the group to be correlated (de Aghion, 1999). In addition, some research suggests suggests that a rise in joint liability defaults may be due to strategic defaults, brought about by lack of flexibility in the adherence to repayment regulation from the lenders' side (Giné et al, 2011).

3.2.5. The Role of Loan Commitments

Traditional, commercial banks make commitments to lend to borrowers in the future, and through that commitment, develop systems needed to screen and monitor the borrowers. The commitments create liquidity by insuring the borrower against the risk of being rationed in a spot credit market in the future (Diamond, 1984; Thakor, 2005). In the context of microfinance, traditional loan commitments are seen in MFIs, but data is rare and hard to come by. However, an example of a unique form of MFI 'loan commitment' can be found in the methodology of group lending, where successful repayment of group loans is encouraged through the promise of access to larger, individual loans in the future. The individuals in the joint liability groups are incentivized to ensure repayment of all, in an effort to reduce the future risk of being exposed to credit rationing (Armendáriz and Morduch, 2010). Following the argument of Stiglitz and Weiss (1981), it is ex-ante efficient for the financial intermediary to threaten with future credit rationing, if joint liability borrowers perform actions that may adversely affect the returns of the MFI. The incentive deters group lenders from undue risk-taking, and increases their incentive to address asymmetrical information issues within the group through the mutual monitoring of economic activities of each by the rest of the group members.

In traditional banking theory, Boot and Marinc (2013) find that loan commitments improve the welfare of its borrowers, despite being a form of commitment which the financial intermediary may ultimately choose not to fulfil (Boot and Marinc, 2013). The intermediary is faced with a trade-off between financial capital and potential loss of reputational capital. The latter can be especially expensive for microfinance institutions, where loss of trust among its borrowers may snowball into increased default rates, which is especially expensive for the intermediary to address, given the lack of traditional collateral. If the MFI does not honour its loan commitment, it liquefies its illiquid reputational capital, in an effort to hold on to its financial capital, a trade-off which may have significant and unforeseen long-term consequences.

3.2.6. Why Lending Strategy Matters

The use of alternative lending strategies to address the weak information available on borrowers, as well as the lack of adequate capital, are both some of the key traits of microfinance activity, which sets the industry apart from traditional banking. Far from just being a development tool to address poverty concerns in developing and emerging markets, it is today also finding increased use in more developed environments. Microfinance initiatives are used reach parts of the population which are considered too risky to be served by more traditional financial intermediaries, and because of this, are left without access to capital.

If we want to understand the potential impact of MFIs as banking institutions, we need to understand what factors carry significant influence on their ability to function as financial intermediaries. To compare the behaviour of microfinance institutions with banks and other traditional financial institutions, we need to look closer the traits which make MFIs unique.

In addition to the reasons stated above, recent studies indicate that the current push towards commercialization of microfinance institutions has caused a marked decline in intermediaries making use of joint lending schemes (e.g. de Quidt et al., 2018; Breza and Kinnan, 2016; Armendáriz and Morduch, 2010; Giné and Karlan, 2014) . If the type of lending used by the MFI has impact on its ability to create liquidity in highly unstable financial markets, the continued disappearance of the lending methodology may have unintended and potentially negative consequences, both for the industry itself and for society as a whole.

Chapter 6 (the second empirical chapter) takes a closer look at the impact of lending strategies upon the levels of liquidity created by MFIs. In particular, I am interested in the effect of diversification of lending approaches upon liquidity creation, and especially whether this applies across all lending strategies or for joint lending methodologies in particular. The results will help shed light on the drivers of liquidity creation in a development context, and provide both practitioners and policymakers with some insight into the hidden impact of changing lending schemes and strategies.

3.3. Macroeconomic Impact

Prior to the financial crisis, most academic literature focused on the client- and micro-levels of microfinance impact (Milana and Ashta, 2012). The reasons for this were two-fold: one, the given primary use of microfinance as a development tool aimed at reducing poverty, making the client outcome a natural key aspect in the evaluation microfinance efficiency. Two, data in microfinance has been notoriously unreliable, to the point where even today reliable country-level analyses are hard to come by, especially if the approach is quantitative (see, for example Cull et al, 2007).

Over the past few decades, available data for microfinance research has significantly improved in quality, enabling better-founded studies both in terms of scale and scope. However, while the impact debate has run hot for a while now, not much has been written with regard to the macroeconomic impact of microfinance on the financial health of the society they operate in. Generally, microfinance is still often considered separate from traditional entrepreneurial finance, and isolated from the rest of the financial structure (Milana and Ashta, 2012).

Some research, such as Ahlin et al., looks at the impact of the general financial context on the performance of MFIs, and finds that the economic health of the surrounding environment does impact the performance of the MFI. The authors find that MFIs are more likely to cover their costs if macroeconomic growth is strong, and that MFIs embedded in more developed financial systems have lower operating costs, lower interest rates and lower default rates (Ahlin et al., 2011).

However, as microfinance begins to move further into the mainstream financial market, it becomes increasingly important to understand not just the level of robustness of microfinance institutions and how they respond to external interference, but also to what degree they in turn have a macroeconomic effect, whether they are able to fulfil the same function as traditional financial intermediaries, and how they potentially impact the surrounding environment.

The evidence of the impact of microfinance institutions is mixed, and numerous studies find both positive and negative correlations. Some studies find empirical evidence suggesting that while small loans yield high returns, these decrease with higher capital investments (de

Mel et al., 2008). Others find evidence of poverty reduction, but more so for non-production loans than production loans, and with larger impact in rural than urban regions (Imai et al., 2012).

Since the crisis of 2008, interest in the degree of robustness displayed by microfinance intermediaries has increased significantly. Prior to 2007, it was believed that MFIs were only mildly affected by shocks in the mainstream financial market and the macroeconomic environment in general (di Bella, 2011). This was affirmed by the negligible impact of the 2001 crisis, but data was scarce and often unreliable (e.g. Cull et al., 2009b).

The financial crisis of 2008 brought a sobering and rather dramatic stop to the explosive growth previously evident in both the number of MFIs emerging and number of loans extended pre-crisis. Growth in the microfinancial sector was subsequently slowed additionally by a general decline in available funds for development initiatives (Ngo, 2012:175). However, while the general growth of microfinance has slowed down significantly, some newer research suggests that micro-businesses with access to microfinance loans are able to withstand significant shock better than those without (Krauss and Walter, 2009; Gonzalez, 2011; Olu, 2009; Oluyombo, 2011). Other research, e.g. a study of the East-Asian crisis in 1997, suggests that microfinance institutions are able to survive financial crises on par with, and sometimes better than, traditional financial intermediaries (Patten et al., 2001:1066).

The ability of microfinance to withstand financial uncertainty relies on prudent financial management within the individual MFIs, and a continued effort to support the development of the external framework within which the MFIs operate (di Bella, 2011).

A more negative outlook on the macroeconomic impact of microfinance is presented by Adams and Raymond (2008). The authors argue that the macroeconomic benefits of growth, reduced poverty and the stability of the agricultural sector, have been vastly exaggerated. They argue that the global amount of funding funnelled into the sector is unknown, and that the industry is fragmented and data is often unreliable. Because we do not know the nature and size of the funding, they state that we cannot know the real impact on poverty levels, and proceed to argue that without subsidies, 90% of all MFIs would cease to exist (Adams and Raymond, 2008). This is supported by a number of other studies, which find that the

real impact of microfinance and microcredit on overall development is hard to identify (e.g. Morduch, 1999a and 1999b; Sharma and Buchenreider, 2002 and Armendáriz and Morduch, 2010).

Other academics refute this, arguing that the fundamental economic key to understanding the impact of microfinance, is its ability to create access to liquidity for customers, who would otherwise have remain unbanked (Milana and Ashta, 2012). Like ordinary finance, microfinance is an approach which connects savers with investors, enabling investments in projects which would otherwise have been deemed too risky. Through innovative lending strategies, the industry thus manages to create new liquidity for an underserviced market, and reach customers without access to the traditional financial market. Bauer et al, note that in addition to increasing access to finance for the unbanked, microfinance institutions were an innovative institutional approach to overcoming agency issues usually associated with asymmetric information (Bauer et al., 2012).

3.3.1. The Regulatory Framework

While the ability of microfinance institutions to help alleviate poverty and provide access to capital for previously unbanked is relatively well covered by a number of studies, there is an increased focus on the importance of a well-functioning regulatory framework to guide microfinance institutions.[22] Microfinance can work, but it needs the right conditions to do so –and if they are not in place, recent events show that the results can be disastrous (Lapenu and Zeller, 2002; Milana and Ashta, 2012). The increased diversity in organizational approaches, strategies and mission statements, combined with the rapid expanse of the sector, has made it clear that a better understanding of the impact of regulation and policy approaches has become increasingly important. Furthermore, the lack of consensus about appropriate ways to measure both its social and financial performance, has made it difficult to evaluate the behaviour and performance of microfinance institutions, and with it, nearly impossible to make recommendations for prudent regulatory policies (Cull et al., 2009b; Milana and Ashta, 2012).

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[22] See, for example, Imai et al., 2012 and Imai and Azram, 2012.

The nature of a prudent regulatory framework is closely linked with the debate outlined previously, on whether microfinance fundamentally is a social tool to reduce poverty, or a financial niche market. In the previous case of Compartamos, the interest rates were severely criticised for being significantly higher than needed to ensure future growth. This has been the case for a number of other large commercial MFIs (Akula, 2010).

Worse, in certain regions, the lack of prudent regulation and oversight of microfinancial activity, was revealed to push poor people into further debt, rather than increase their financial well-being. In Andra Pradesh, a number of suicides were blamed on excessive pressure to repay micro-loans, though no causal relationship was proven (Sanderson and Sengupta, 2011). However, the local authorities responded with regulatory measures, which effectively shut down local operations, and indirectly encouraged clients to default on their loans. Some critical voices have pointed out that competing government interest may have had interest in shutting down local competition in the market (Banerjee et al, 2010). Since the events of 2010, the Indian government has made the Reserve Bank the main regulator of microfinance institutions in India, in an effort to standardize the regulatory framework imposed on the industry. The sector in this case, is currently regulated separately from the rest of the financial market (Sanderson and Sengupta, 2011; Milana and Ashta, 2012).

These events caused some tarnish to the reputation of microfinance as legitimate tool for poverty reduction, but did help highlight the need for prudent regulation of the industry. Assurance that MFIs are careful and diligent in their lending and monitoring is key to the success of microfinance, since the social contract will cease to exist if too many clients default on their loans (Conning and Morduch, 2011).

If the microfinance industry is considered apart from the traditional financial market, there is less incentive for lawmakers to be aware of potential negative impact from MFIs upon the general financial health, or vice versa. As pointed out previously, Ahlin et al, finds clear evidence that the general financial market impacts the health of the MFIs operating within it (Ahlin et al., 2011). The risk associated with microfinance should therefore not just be considered in relation to the niche market alone, but also to the risk potentially posed for the financial market as a whole (Banerjee, 2013).

The impact of regulation has previously been covered by a number of studies, mostly interested in its impact on the financial performance and sustainability of MFIs. In their 2011 study, Cull et al., found that regulation and supervision helps for-profit MFIs to keep their profit margins healthy, but has negative impact on the MFI's level of outreach (Cull et al., 2011). Contrary to this, non-profit MFIs instead reduce their profit margins, but generally manage to keep their level of outreach to marginalised and more costly customers.

Other studies find that while regulation is associated with increased cost for the MFI, in the form of technology investments and security, it is also correlated with increased trust among MFI customers (Mersland and Strøm, 2009). The same authors, however, also found that increased regulation risks stifling innovation within MFI.

Hartaska et al. find that more traditional financial institutions tend to have higher costs associated with regulation than MFIs, due to higher and more restrictive levels of regulation (Hartaska et al., 2013). If the same regulation is imposed on MFIs, the authors argue that the increased costs neutralize the technical progress made by the MFIs. Because of this, the regulatory framework should encourage microfinance institutions to increase their management and governance capacity. The findings of regulatory impact is not conclusive across studies, however. For example, Hartaska and Nadolnyak found that a regulatory framework does not directly impact the financial performance or outreach of MFIs (Hartaska and Nadolnyak, 2007)

In terms of ensuring good corporate governance within the institutions, Barreiro and Ducasse suggest a Code of Conduct for MFIs, in accordance with the international standards for good practice in companies and institutions in general. The aim of the code is to promote a common culture and framework which encourages best practice within the institution (Barreiro and Ducasse, 2012).

3.3.2. Why Macroeconomic Impact Matters

Despite the increased view of microfinance as more than just a development tool, used primarily by donors and NGOs to reach a set of pre-determined social goals, we know very little about how MFIs interact with its surrounding macroeconomic environment. This is in part due to limited data, which until recently furthermore had very low levels of reliability, but is also due to a lack of studies which specifically examine the financial behaviour of MFIs. As previously mentioned, the first empirical chapter seeks to help remedy this, by studying the level of liquidity created by microfinance institutions, thus providing further understanding of their ability to fulfil the functions of a financial intermediary.

We need to improve our understanding of the financial impact of MFIs, so that we may develop relevant and effective regulatory frameworks for the industry to operate within, as well as to more effectively be able to harness the possible macroeconomic benefits that the industry creates.

In an effort to shed some light on the impact of regulation on the ability of MFIs to fulfil their function as liquidity creators, the third empirical chapter looks at the relationship between the regulatory status of MFIs and levels of liquidity created for the market. I use a range of macroeconomic variables to control for the impact of other contextual factors, and use a range of cross-country and regional estimations, with country-level fixed effects.

3.4. Access and Outreach

Ever since the re-emergence of modern microfinance, there has been debate about the best approach to it: does scaling up the size of microfinance operations mean increased outreach? What is the optimal size of microfinance institutions – and how does size impact the behaviour and performance of MFIs? Does increased scope and depth of microfinance services improve outreach? How poor can clients be and still benefit from microfinance, and does increased product and lending diversification improve MFI performance? In the following section, I present some of the key findings, from studies that seek to analyse the impact and importance of scale in microfinance, as well as its scope and depth of outreach.

3.4.1. The Scale of Microfinance

For microfinance institutions, the debate on best practice in microfinance takes place both in terms of scale and scope. In terms of scale, questions are raised with regard to whether larger, successful microfinance institutions such as Grameen Bank, or the commercial for-profit organisation Compartamos in Mexico, experience significant mission drift as they grow in size. The concern regarding size is often accompanied by the additional worry that with size comes increased for-profit emphasis by microfinance institutions which initially started out as non-profit initiatives.[23]

While looking at the traditional banking sector, DeYoung notes that the share of assets in small business lending is negatively correlated with the size of the banks studied, and Berger et al. suggests that smaller financial intermediaries make use of fundamentally different lending methodologies than larger intermediaries do (DeYoung et al., 1999; Berger et al. 2003). Additionally Pilloff and Rhoades find that larger financial intermediaries do not have net competitive advantages when compared with smaller banks (Pilloff and Rhoades, 2002). These findings are all in line with what has generally been observed within the microfinance sector, where unique lending methodologies are employed to reach customers otherwise left unserved by larger financial intermediaries (see, for example, de Aghion and Morduch, 2005; Hermes and Lensink, 2007).

From a macroeconomic perspective, newer research finds that microfinance does appear to have a positive impact on the population in question, due its ability to raise the equilibrium wage (Buera et al., 2012). However, the same study also finds that a scaling up of microfinance initiatives does not appear to have significant impact on income per capita. This is because the aggregate total factor productivity is countered by lower capital accumulation from the redistribution of income.

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[23] For further discussion of this, please see the previous section of this chapter, on the identity of microfinance.

3.4.2. The Scope of Microfinance

The scope of microfinance came to the forefront of the debate in what Milana and Ashta defines as 'the second microfinance revolution' of the 2000s, which focused on 'customer-centred finance' (Milana and Ashta, 2012). This approach is focused on the needs of the customer, and attempts to develop financial solutions and packages, which addressed a combination of social and financial needs. The provision of both credit, insurance and social support, was seen as a way to ensure that the both the social aims of microfinance were reached, as well as its financial goals (Collins et al, 2009; Hartarska and Mersland, 2012). The shift meant an expansion of products, to include both microsavings and insurance options. However, while the microfinance portfolio has developed rapidly in some parts of the world, others are still underserved and without adequate access to both savings and insurance (Banerjee and Duflo, 2007).

The expanded microfinance context, and move from micro-credit to microfinance in the 1990s, where the focus was heavily on the institutional impact and context of microfinance and development in general, allowed a much broader range of institutions to fall under the microfinance bracket (Morduch, 2000).

This broadened range of institutional contexts also brought with it a wide range of ideologies and perspectives, which caused the clash between for-profit and non-profit approaches, as outlined in the 'identity section' above. However, the debate has also impacted the academic discussion on how best to ensure optimal outreach in microfinance activities, but results so far appear to be non-conclusive. While some studies, such as Quayes and Tanweer find a positive correlation between financial self-sustainability and outreach, others find either no difference, or in some cases, both increased efficiency and outreach amongst non-profits, compared to for-profit MFIs (Quayes and Tanweer, 2014; Sagamba et al., 2013; Nghiem, 2007). Instead, these studies suggest that it is more a question of the quality of strategies employed and the maturity of the individual institution, which determines the extent of an MFI's outreach.

Concerns have been raised that it may not always be in the interest of smaller savings and credit institutions to let go of its good clients, as they move beyond the loan-size of traditional microcredit (Jensen, 2009). This is especially a concern in situations where a smaller MFI with sharp capital constraints seeks to become a formal partner of a larger

commercial institution. The smaller MFI experiences a potential clash between desires to maximise performance and its stated social mission to reach the most deserving clients. Instead of focusing continuously on poorer and previously unbanked clients, the financial intermediary is tempted to hold on to its larger clients and thereby risks exhausting its capital trying to serve their needs.

For-profit institutions are typically concerned with the breadth of services offered, including an increased number of clients, and long-term survivability. Non-profit organisations, on the other hand, tend to use the social, poverty-reducing approach, which focuses on the depth of service, especially in reaching increasingly disadvantaged groups (Nghiem 2007; Schreiner, 2002). The social approach assumes that the depth of outreach can compensate for a narrow breadth, short length and limited scope. Conversely, the financial sustainability approach assumes that a wide breadth, long length and ample scope can compensate for a shallow depth (Shreiner, 2002).

Supporting the view that there is a trade-off between efficiency in terms of reaching social goals and the depth of MFI outreach, Hermes et al. finds that the level of outreach is negatively correlated, both to percentage of female borrowers, as well as small loan size (Hermes et al., 2011).

3.4.3. Why Access and Outreach Matter

In both traditional banking literature, as well as in microfinance research, the discussion about the scale and scope of the optimal institutional entity is not new. And while this thesis does not dwell primarily on the impact of size upon levels of liquidity created and MFI performance, it is nonetheless an important and consistent variable to keep an eye on. As was demonstrated previously by the life-cycle theories, the age and size of MFI may have direct impact on the behaviour, efficiency and strength of links to the surrounding financial market. For this reason, both size and age are variables which are used consistently as controls in estimations across all 3 of the following empirical chapters.

Additionally, the scope of microfinance, in terms of outreach and depth of service, is a debate that continues to raise questions. Microfinance is not the only tool that may be

employed to reduce poverty, and it is important to further understand the relationship between the ability to reduce poverty, fulfil social goals and the ability to perform the functions of a traditional financial intermediary, as liquidity creator.

3.5. Research Challenges in Microfinance

Most empirical research in development faces considerable difficulty with regard to the reliability of the data used. This is especially true for an area such as microfinance, which relies on specific types of accounting data to measure the financial performance of intermediaries engaged in microfinancial activity.

The opinions on how to best measure financial performance in microfinance are many and varied. Some research relies on return on assets and return on equity as the primary indicators of internal financial performance, which may or may not be adjusted (Cull et al., 2007; Christian, 2002). In general, however, standard return on assets and equity are often seen as too simplistic summaries of inputs and outputs (Olivares-Polanco 2007; Khan et al., 2017).

Instead, some studies advocate the use of financial and operational self-sufficiency indicators. Financial self-sufficiency measures the MFI's ability to operate without ongoing subsidy, including soft loans and grants, and is defined as adjusted financial revenue, divided by the sum of adjusted financial expenses, adjusted net loan loss provision expenses, and adjusted operating expenses (Cull et al., 2007; MicroBanking Bulletin, 2007). Cull et al., who use all 3 types of performance indicators in their regressions, consider FSS the more accurate to measure performance, and argue that without it, any conclusions regarding the performance of MFIs become too inaccurate (Cull et al., 2007). However some practitioners and academics argue that it is extremely challenging to produce a reliable FSS ratio, and the most common measurement included by academic is still operational self-sufficiency (OSS), which measures to what extent the MFI is able to cover its costs through operating revenues (Yaron and Manos, 2007; Schäfer, 2011; Khan et al., 2017; Hartaska et al., 2007).

3.5.1. Data Availability and Interpretation in Microfinance

One of the key issues facing microfinance research is as mentioned the lack of reliable data. As the microfinance industry matures, access to larger datasets with more audited data improves, yet it is still an issue that causes major challenges for researchers. Most studies, including this thesis, use the MIX database for their work, although this database still contains significant amounts of unreliable and unconfirmed data, making the data cleaning process both tricky and laborious[24].

However, even when the same data is used, very different results can be reached, based on the methodological approach chosen. In 1998, Pitt and Khandker found that microfinance initiatives in Bangladesh had a positive impact on efforts to reduce poverty, especially if the efforts specifically targeted women as clients (Pitt and Khandker, 1998). However, 10 years later, Roodman and Morduch used the same dataset, and found that the previous conclusions could not be replicated, due to faulty data and issues of reverse causality (Roodman and Morduch, 2009). The debate evolved into an argument about prudent econometric measurements, with Pitt countering Roodman and Morduch's findings in 2011 (Pitt, 2012). He argues that the econometric model used by Roodman and Morduch is flawed, and not appropriate to discern the impact of microcredit, as well as having used a different set of control variables, which he sees as less appropriate (Pitt, 2012). Roodman and Morduch then subsequently fired back, arguing that even when adapting the variables previously used, the results were still problematic, since the positive impact in their mind stemmed largely from 16 outliers from 14 households, causing bimodality. When the 16 highest spending observations were dropped, the bimodality collapsed into one, and results moved towards zero impact (Roodman and Morduch, 2014)

While there is continuous debate about how to best measure the impact of microfinance, there does, however, seem to be a shared consensus that microfinance *can* work with the right conditions. As Milana and Ashta note, "*Notwithstanding persistent problems and malpractice examples, microfinance seems to be firmly here to stay.*" (Milana and Ashta,

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[24] For further discussion specifically on the data limitations of the MIX database, please see section 1.4.1, 'Dataset Concerns', under limitations in the introduction.

2012:299). However, the accuracy of future research will be dependent on an increase in the reliability, the scale and the scope of available industry data.

The following 3 empirical chapters take a closer look at the financial behaviour of microfinance institutions. Using MIX data from 2004 to 2012, chapter 4 uses recent literature in traditional banking, to study the level of liquidity created by microfinance institutions for the market. Chapter 5 looks at the drivers and determinants of the liquidity creation in MFIs, and estimates the impact of diversification and lending strategies upon levels of liquidity creation. Finally, chapter 6 looks at the relationship between the regulatory framework and the levels of liquidity created by MFIs across geographical regions.

4. Liquidity Creation in Microfinance

In traditional banking literature, one of the primary functions of financial intermediaries is to facilitate the transformation of liquidity for the market, by issuing liquid, usually short-term, liabilities, while holding illiquid, long-term assets (Acharya et al., 2010; Berger and Bouwman, 2009). The intermediary bridges the gap between borrower and lender through the liquidity transformation process: it mediates investments in long-term illiquid assets, without taking undue risk (Diamond and Dybvig, 1983). The study of how and how much financial institutions help bring about investments, which would otherwise have been considered too risky for the investor, is key to understanding the role of financial institutions engaging in microfinance. Increased insight helps policymakers and practitioners design and implement prudent strategic and regulatory frameworks, for traditional banking as well as for the microfinance sector.

The level of liquidity of an asset refers to speed and cost with which the asset can be converted into liquid funds, such as cash. It is "…*the degree to which an asset or security can be bought or sold in the market, without affecting the asset's price*" (Ledgerwood and Earne, 2013:39). The level of liquidity is relative to both the level of urgency required and the difficulty in getting rid of the asset, to attain the liquid funds.

The liquidity transformation process has been proposed measured through the transformation of maturities, by calculating the scaled gap between liquid liabilities and illiquid assets (Schaefer and Deep, 2004). However, more recent literature suggests that a better way to look at the transformation process is to consider the change in *ease, time and cost* required for both client and investor to engage with each other through the intermediary (Berger and Bouwman, 2009). Berger and Bouwman argue that a change in the length of maturities is not a sufficient way to measure the level of illiquidity of a loan, as short-term loans without traditional security may be significantly harder to get rid of, and come with higher levels of risk, than well-secured long-term investments (Berger and Bouwman, 2009; Berger et. al, 2011; Horvath et al, 2013).

A good example of this is the lending activity of microfinance institutions. The maturities of microfinance loans is typically quite short (usually 3 to 12 months), due to the very small loan sizes provided. However, the transformation of liquidity still takes place: the MFIs facilitate loans to clients that would otherwise not have had access to capital, or at best be subject to the usury lending activities of loan sharks. The liquidity transformation, or creation, happens through a shift in the *ease, time and cost* required of both clients and investors.

Prior empirical banking literature has found positive relationships between capital and the liquidity created and for large banks, while significant negative relationships are observed for smaller banks (Berger and Bouwman, 2009; Horváth et al., 2013). In addition, deposit insurance was found in one study to be significant for banks with large ratios of household deposits, while insignificant to the level of liquidity transformed in another (Fungacova et al. 2016, Schaefer and Deep, 2004). However, evidence is still sparse, and so far, the literature has focused primarily on commercial banks in developed markets. Financial markets in developing and emerging economic regions face a number of additional and unique challenges, which are likely to have impact on the levels of liquidity created by its intermediaries. Access to credit registries is rare, and levels of consistent regulation and supervision vary significantly across regions.[25] In addition, the organisational structure of microfinance institutions is a lot less homogenous than that of commercial banks in stable financial markets.

This chapter expands the existing literature by investigating liquidity creation (LC) and its main drivers in a cross-country study of the microfinance industry. Understanding the microfinance sector, and its ability to create liquidity for the market it operates in, is an important part of grasping the nature and state of the financial markets in developing and emerging economies.[26] This is especially true for economies where microfinance has become the primary, and in many cases the only, alternative source of capital to usury

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[25] While I do control for both regional and regulatory effects in the estimations here, please see chapter 5 for an in-depth study of regulation in microfinance.

[26] Microfinance is an umbrella term for a range of financial services, traditionally aimed at poorer segments of society, of which the best known and most developed is microcredit. For a detailed definition of microfinance, please see Appendix B.

moneylenders for small, often informal enterprises.[27] By increasing access to capital for sections of the market otherwise left unserved, successful microfinance institutions have proven a viable and often financially self-sustainable tool in the efforts to reduce poverty in developing countries. The MFIs mediate investments in illiquid assets previously thought too risky and troublesome, thereby expanding the market and level of liquidity created.

The dataset used has been pulled from the MIX database, comprises 1121 MFIs, from 98 countries in 6 regions, and spans the period 2004 – 2015. In this chapter, I adapt the methodology used in previous banking literature to the unique conditions of microfinance. I attempt to compare the ratio levels of liquidity created by MFIs, to that found in more traditional financial intermediaries.[28] I use panel data from the microfinance institutions to study the effects of traditional impact measurements on liquidity creation. The chapter offers insight into the ability of MFIs to produce liquidity on par with more traditional banks. Because of the unique development conditions that MFIs typically operate under, I also control for profit-status of the MFI, its organisational type, regulatory status, the presence of deposit insurance and geography.

I observe a strong negative relationship between capital and liquidity creation, which corresponds with the findings among of other traditional banking studies (e.g. Berger and Bouwman, 2009; Horváth et al., 2013). The high levels of cash and cash equivalents typically held by MFIs does not seem to hinder the MFIs in extending microfinance loans to its customers, on par with the lending activity in traditional banks.

Also in line with previous literature, I find a negative correlation between the size of the MFI and ratios of liquidity created for the market, when LC is scaled by size, though with weaker consistent significant than in previous studies (e.g. Fungacova et al., 2017; Berger and Bouwman, 2009; Horvath et al., 2013). In addition, I observe a significant and consistently positive relationship between regulation and the levels of LC, and relatively uniform ratios for liquidity creation across most geographical regions.

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[27] The extent to which it still is, has been the cause of heated debate over the past few years. Please see previous chapters for details.

[28] I refer here primarily to the empirical framework proposed by Berger and Bouwman to measure liquidity creation, which uses liquidity categories based measurements instead of just maturity (Berger and Bouwman, 2009).

While the impact of risk taken by the bank is negative as expected, I find inconclusive significant correlation between levels of bank risk and levels of liquidity creation. In addition, the presence of deposit insurance appears to have insignificant impact on the level of liquidity created, thus rejecting the financial fragility hypothesis for MFIs, in which a bank withholds effort unless worried about potential bank runs[29]. Thus, the results suggest that other stress parameters such as conditions unique to the development context may impact MFI output higher than the fear of bank runs and capital risk.

The study contributes to existing literature in two ways. First, it provides additional empirical evidence to a fledgling body of literature on the measurement of liquidity creation within traditional banking research. Second, unlike previous studies, this research looks at the ability to create liquidity in developing markets. Where the previous literature studies commercial banking operating in stable, well-developed financial markets, the microfinance institutions studied here operate in riskier environments, where unstable and less-developed regulatory and macroeconomic frameworks could be expected make the ability to create liquidity significantly harder.

Thus, the study provides a first insight into the ability of microfinance institutions to create liquidity for the market. The results indicate that institutions which engage in microfinancial lending, are able to create liquidity for the markets they operate in, on par with and sometimes in excess of, that of traditional intermediaries. This ability appears to be consistent across geographical regions. In addition, the status as NGO appears to be positively correlated with levels of LC, when values are scaled. This may be the result of the unique lending practices employed to a higher extent by less formal institutions, an issue explored further in chapter 5.

The chapter is structured as follows. Section 4.1 provides a brief discussion of key theoretical and empirical literature. Section 4.2 presents my research question and formed hypotheses. Section 4.3 discusses the methodology used to measure liquidity creation, as well as the fixed effects model used to estimate the impact of a number of traditional and microfinance-specific drivers of LC. Section 4.4 details my dataset, and section 4.5 presents

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[29] For in-depth discussion of the financial fragility hypothesis, please see Diamond and Dybvig (1983) and Diamond and Rajan (2001).

my results and a discussion of them. Finally, section 4.6 provides a summary of the findings, their practical and academic implications as well as propositions for future research.

4.1. Literature

In the following section, I provide a brief overview of the theoretical and empirical literature on the creation of liquidity.[30] I place my research question in the outlined debate, and draw my hypotheses from the presented literature.

4.1.1. Financial Intermediation

In a perfect economic system, financial intermediaries would not be needed. If the behaviour of agents was purely rational, and markets were perfect, the agents would be able to correctly interpret the risk relevant to an investment, and could price a planned transaction adequately. However, due to imperfect financial markets and issues arising from asymmetric information, a mediating agency is required to reduce risk and transform liquidity (Manchev, 2009). From a macroeconomic perspective, financial intermediaries are thus necessary institutions for two key reasons - they transform and reduce risk and create liquidity for the market (Greenbaum and Thakor, 2015). By allocating capital from the lender to the borrower, the intermediary reduces the risk otherwise associated with long-term investments, which are necessary to maintain a strong macroeconomic environment (Manchev, 2009).

4.1.2. Liquidity Creation

Through the activities of the financial intermediary, an illiquid claim is held by the intermediary against the borrower, while the depositor holds a liquid claim against the intermediary (Gurley and Shaw, 1960). Deposit-taking financial intermediaries allow their customers to withdraw saved funds when a liquidity need arises. The provision of liquidity

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[30] For an in-depth discussion of current trends in microfinance research overall, please see chapter 3.

lets the intermediary accumulate funds, which enable it to invest in long-term activities. The allocation of capital between lender and borrower reduces the riskiness and cost of the transaction, as well as allowing the intermediary to take advantage of economies of scale (Bhattacharya and Thakor, 1993).

Some research suggests that the creation of liquidity becomes especially important in times of crises, and in regions and markets where alternative sources of funding are harder to come by, such as those of developing nations and financially challenged regions of developed economies. When the creation of liquidity by financial intermediaries is reduced, profitable investment and production activities will be limited, resulting in a misallocation of resources (Rajan et. al, 2002; Acharya et al, 2010). Acharya et al. suggest that bank liquidity may be counter-cyclically relative to the general health of the economy, and that the 'pledgability' of risky activities is key to determining whether the intermediary holds the right level of liquidity from the viewpoint of the general economy (Acharya et al., 2010:4). Note that 'bank liquidity' here is different from the liquidity creation measured in this study: a high level of bank liquidity means that the financial intermediary is holding on to its liquid assets, and *thus create less liquidity* for the general market. Particularly relevant to microfinance, Acharya et al. find that financial intermediaries hold larger amounts of liquid assets in countries which have less developed accounting standards, lower market capitalization relative to GDP and lower liquidity in stock markets (Acharya et al., 2010).

Bryant (1980), as well as Diamond and Dybvig (1983), have developed models of traditional banks as creators of liquidity. The models show how investors can be exposed to temporary liquidity shocks, which creates the demand for access to non-time deposits at par value, in order to meet sudden variations in liquidity needs. A deposit contract helps insure against shocks due to the non-convexity of separate, individual insurances, needed to address the myriad of risks facing an agent.[31] However, the variance in withdrawals of deposits exposes

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[31] Non-convexity is abnormal or extreme behaviour in economics, which fall outside traditional in-between values and thus is hard to predict. Non-convexity is often associated with market failure and market inefficiencies (Starrett, 1972).

the bank to risk, especially if there is the fear that other depositors may withdraw their funds before you, and cause a potential run on the bank (Diamond and Dybvig, 1983).[32]

Bhattacharya and Thakor (1993) explain that as long as no-envy conditions are in place, a "good" Nash equilibrium holds true across different patterns of preference. However, a "bad" Nash equilibrium may also exist, in which the allocation of asset liquidation is different from that which would be optimal for the established deposit contract.[33] Because the deposit contract must adhere to the constraints imposed by sequential service constraints (SSC), the financial intermediary is unable to adapt its deposit payments to fit the new situation.[34] The presence of SSC causes the depositor in question to decide whether to withdraw or not based on the supposed behaviour of other depositors. If the agent trusts that other agents will not withdraw prematurely, the 'good equilibrium' remains. However, if the depositor believes that his investment is threatened by the premature withdrawals of other agents, a 'bad equilibrium' comes to be, and the presence of SSC can cause a bank run (Bhattacharya and Thakor, 1993). The risk of a bank run provides a strong incentive for the depositors to monitor the actions of the bank, which in turn helps discipline the actions of the bank, and keeps it from withholding effort (Diamond and Dybvig, 1983, Diamond and Rajan, 2001, Calomaris and Kahn, 1991).

Financial intermediaries can hold liquid assets to minimise some of the risk associated with liquidity creation. However, unless the deposits are bound for a specific time period, or covered by deposit insurance, the intermediary still faces the risk of a bank run from depositors, if customers lose trust in the intermediary (Diamond and Dybvig, 1983). The risk can also be addressed through access to state- or donor-financed emergency capital, though access to such capital may reduce the intermediary's incentive to hold enough liquid assets

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[32] The Diamond-Dybvig model does not distinguish between bank runs, in which just one bank is involved, and bank panics, which involves simultaneous runs across the sector. Gorton (1988) develops a model in which correlation between runs come from systemic risk information. Unlike Diamond and Dybvig, Gorton does not see bank runs as sunspot phenomena, but as an economic event caused by the initial run and subsequent spread of information.

[33] Nash equilibrium is a concept borrowed from game theory, in which two or more players engaged in a non-cooperative game, are assumed to know the gaming strategies of their competitors, and no player stands to gain from changing their own strategy. In this situation, the strategy choices and payoffs from these constitute a Nash equilibrium (Vives, 1990).

[34] Sequential serving constraints happen if more people wish to withdraw their deposits than the bank holds capital to cover (Diamond and Dybvig, 1983).

to meet day to day liquidity demands (Song and Thakor, 2007). The financial intermediary will consider the costs and benefits of holding a certain amount of liquid assets, when serving the demands of both borrowers and depositors, but like deposit insurance, the presence of easy grants or loans available at discount, may reduce the intermediary's efforts to prevent bank runs and meet daily liquidity demands.

If donor or state-financed capital is not available to the financial intermediary engaged in microfinance, the option of short-term borrowing from larger, more traditional banks is an option. However, unlike state or donor-sponsored loans, these loans are typically not at discount rate, and will often end up being expensive and detrimental to the financial well-being of the MFI. Additionally, unless the funds are accessible through a form of risk-free guarantee, given by donor or state for political or social reasons, the loans are associated with significant costs both in the form of collateral, and interest. Bouwman (2013) notes that borrowing from the discount window for traditional US banks may also be associated with perceived weakness. While the same may be true for MFIs, the lack of transparency and strong financial regulation in most regions where MFIs operate is likely to reduce the effect.

Maturity and Liquidity Transformation
Echoing the findings of Diamond and Dybvig (1983), it is noted by Bhattacharya and Thakor (1993) that liquidity transformation takes place in economic environments where shocks disturb the ability to time consumption based on preference, and that maturity transformation happens as a consequence of the intermediary's provision of liquidity. The authors argue that asymmetric information and friction can make it beneficial for the bank to fund long-term, illiquid assets with short-term, liquid liabilities and to have its liabilities repriced frequently (Bhattacharya and Thakor, 1993).

Financial intermediaries gain from the transformation of maturities through a positive term premium in the yield curve, and by increasing the creation of liquidity through maturity mismatching. The intermediary's incentive to adequately screen and monitor its loan quality is increased if the liability term is shorter than the loan term, due to the noise that repeated price evaluations of deposits would create in the same term period (Calomaris and Kahn, 1991). Additionally, evaluations from agents mean that the intermediaries can be

exposed to increased liquidation costs at the time of refinancing regardless of their solvency. Diamond suggests that maturity transformation can increase the accuracy and frequency of the information relayed from intermediary to depositors, and thus reduces liquidation cost and risk (Diamond, 1997).

4.1.3. Liquidity in Microfinance

Very few studies focus on liquidity in microfinance in general, and what does exist is almost entirely practical in nature, and is primarily aimed at improving the management of liquidity amongst practitioners (e.g. Ledgerwood et al., 2013; Jansson and Taborga, 2000; Brom, 2009) . In addition, while no previous research has looked at the role of MFIs as liquidity creators specifically, the few that have looked at liquidity in microfinance, have done so from either a liquidity management or liquidity risk perspective (Brom, 2009). Brom notes that liquidity risk for MFIs is one of the primary risk factors for the intermediaries, and that institutions tend to think appropriate liquidity management equals avoidance of 'idle cash'. Instead, she recommends measuring liquidity risk through a matching of maturities of the MFI assets and liabilities, having a plan for refinancing and having adequate emergency funds (Brom, 2009). Brom also notes that it is important for MFIs to match re-pricing terms for its assets and liabilities, in order to avoid the potential risk of re-pricing, and potential negative impact on profitability. This is done by ensuring that a loan portfolio, which is long-term and fixed rate, is funded by long-term and fixed-rate liabilities (Brom, 2009). However, given the small size of microfinance loans, they tend to have very short maturities, and are funded by deposits, donations or longer-term liabilities. Thus, maturity length becomes less important in microfinance, than the *ease, time and cost* for client and investor, as defined by Berger and Bouwman below (Berger and Bouwman, 2009).

It is worth noting here that holding on to liquid assets, while keeping the institution liquid, also lowers the ability of the MFI to create adequate levels of liquidity for the market. Too much liquidity creation is indeed risky for the solvency of the microfinance institution, if undue risk is taken. However, too little liquidity creation hinders adequate access to capital for the intended clients, seen from the perspective of society as a whole. Berger and Bouwman describe the balance act between the two, and shows how too much liquidity

creation can create a financial crisis, while too little can make an existing crisis much worse for the intended customer (Berger et al., 2011; Bouwman, 2013). This is supported by the findings of Fungacova et al., who show that high levels of liquidity creation in Russia are associated with higher levels of bank failure (Fungacova, et al., 2015)

4.1.4. Empirical Studies

Most empirical studies attempting to measure the level of liquidity created in traditional financial intermediaries have surfaced in the past 5 years. An earlier attempt to measure levels of liquidity was introduced by Deep and Schaefer, in 2004. The authors used loan maturity data from the largest US banks in the time period 1997 to 2001, to calculate the 'liquidity gap' between illiquid liabilities and working capital. In the study, Deep and Schaefer propose measuring the distribution of liquidity in financial intermediaries, by calculating the 'liquidity gap' between total liquid liabilities and assets, scaled by total assets. The values are from -1 to 1, with higher values denoting a higher level of liquidity creation. A positive value indicates that the financial intermediary finances illiquid assets with liquid liabilities, and through it, creates liquidity. They classify liabilities and assets solely based on the lengths of their maturity, and specifically exclude off-balance sheet activities such as loan commitments, citing their contingent nature (Schaefer and Deep, 2004).

The authors find that the liquidity gap on average is small, approximately 20% for large US banks. They conclude that the low level of liquidity created is not due to the presence of deposit insurance, since the deposit insurance tends to replace uninsured liabilities instead of expanding the existing loans or deposit base. Instead, the authors argue that the dampening of liquidity transformation should be found in credit risk (Schaefer and Deep, 2004).

A more recent attempt at calculating liquidity produced for the market, is done in a study by Berger and Bouwman (2009), who use data from US banks with assets over $1 million, in the time period 1993 to 2003. The authors find that as much as 80% of all liquidity created in the US market, is created by banks with assets over $1 billion, lending credence to the notion 'too big to fail'.

Berger and Bouwman propose a way to measure liquidity creation, based on four distinct calculation measures: cat fat, cat non-fat, mat fat and mat-non-fat. Mat denotes a classification based on maturity, where the cat methodology classifies assets and liabilities by product. Fat and non-fat defines whether or not the methodology includes off-balance sheet activities. The preferred measure for Berger and Bouwman is category-based classification including off-balance sheet activities (cat fat). Their mat non-fat measurement, in which the classification of liabilities and assets is based entirely on maturity and off-balance sheet activities are not included, is conceptually identical to Deep and Schaefer's approach. Unlike Deep and Schaefer, Berger and Bouwman include most commercial banks, as opposed to focusing strictly on the largest intermediaries. They do, however, exclude banks that do not take deposits, as well as banks with negative equity.

Berger and Bouwman specifically include off-balance sheet activities, arguing that findings by Holmström and Tirole (1998) and Rajan et al. (2002) suggest that liquidity creation also can be accomplished through off-balance sheet activities such as loan commitments and other claims to liquid funds (Berger and Bouwman, 2009).

The study shows how the liquidity created by the US banks almost doubled between 1993 and 2003, increasing incrementally every year. The banks created €2843 trillion liquidity in 2003, which was 4.56 times the level of overall bank capital, and 39% of their total assets (Berger and Bouwman 2009). Looking specifically at the relationship between capital and liquidity creation, Berger and Bouwman find that the relationship is positive for large and medium banks, while negative for smaller banks (Berger and Bouwman 2009).

A number of empirical studies have since used the Berger and Bouwman measurement of liquidity creation, including the work by Fidrmuc, et al. (2015). Here, the authors look at the impact of deposit insurance on bank capital and liquidity creation in Russian banks, where deposit insurance was introduced in 2004. The study finds a negative correlation between bank capital and the creation of liquidity, both before and after the introduction of deposit insurance. Additionally, they find that the strength of the impact varies with size and ownership: they observe no significant correlation for large, foreign or state-owned banks, while they find a significant negative relationship for private, small and medium domestic banks (Fidrmuc et al., 2015).

Another recent study using the Berger and Bouwman measurement of liquidity creation, is a 2014 study of Czech banks from 2002 to 2010, by Horvath, Seidler and Weill (Horvath et al., 2013). The authors study the causal relationship between capital and liquidity creation, by running a series of Granger-causality tests. Like Berger and Bouwman, they find a consistent increase of liquidity creation through the observed period, and note negative impact on liquidity creation by capital in the Czech banks, which fall within the 'small' category of Berger and Bouwman. (Horvath et al., 2013).

While Fidrmuc et al. (2015) and Horvath et al. (2013) found a negative relationship between bank capital and liquidity creation for small financial intermediaries, Rauch et al. find no relationship between the size and liquidity creation in German savings banks (Rauch et al., 2009).[35] Employing data from 457 savings banks between 1997 and 2006, the authors use Deep and Schaefer's LT Gap, as well as the Berger-Bouwman measurement of absolute amounts of liquidity created for the market. They find a significant positive correlation between liquidity creation and the general health of the economy, as well as a positive and significant effect of the yield curve spread, suggesting that a lower ECB refinancing rate positively impacts liquidity creation (Rauch et al., 2009:21). The authors argue that, due to a strict regulatory framework, the German savings banks do not have to hold large buffers of liquid capital for risk management reasons, but instead that the use of relationship lending increases the quality and scope of their monitoring abilities, and enables the intermediaries to better anticipate loan defaults (Rauch et al., 2009:22).

As can be seen from the discussion above, previous studies of liquidity creation have focused entirely on the banking sector in developed and emerging markets. In the field of microfinance, there exists very literature discussing liquidity at all, and to my knowledge, no previous research has attempted to evaluate the ability of MFIs to function as traditional liquidity creators. Further insight into this will help policymakers and practitioners determine the best use of microfinance from a macroeconomic point of view, and help

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[35] Most empirical studies of liquidity (e.g. Berger and Bouwman, 2009; Fungacova et al. 2017 and Horvath et al., 2013) find a negative correlation between small banks and LC, and use assets as their determinant of size. However, Rauch et al. use the number of borrowers, which might explain the conflicting results.

expand the understanding of the liquidity transformation processes in microfinance, as well as its drivers.[36]

4.2. Research Question and Hypotheses

To address the gap in literature identified above, I seek to answer the following in this chapter:

How do deposit-taking microfinance institutions perform as liquidity creators for their surrounding markets and are the process driven by the same financial factors as in more traditional intermediaries?

   a) How do deposit insurance and capital impact the level of liquidity created by deposit-taking MFIs??
   b) To what extent are levels of liquidity created in microfinance impacted by traditional bank characteristics, such as size, capital, deposit insurance, performance and risk?

4.2.1. Hypotheses

Best practice accounting standards in microfinance follow the double-entry principle, in which the assets of the balance sheet equal liabilities plus equity. The same principle is used in the calculations provided by previous literature on traditional, to measure levels of liquidity. While it is clear that certain entries, such as donations, will be different for microfinance, the core principles remain the same.

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[36] This chapter specifically looks at liquidity creation from a banking perspective. While I control for market conditions specific to developing and emerging financial markets, the characteristics studied here are similar to those found in more traditional studies. For an in-depth look at the impact of the unique lending strategies of MFIs, see chapter 4.

H1: Due to an unstable economic and regulatory environment, levels of LC are expected to be lower than in traditional banking.

Given the split focus of MFIs on both social and financial goals described in the previous literature chapter, it is entirely possible that MFIs are not able to produce liquidity for the market in the same way that traditional financial intermediaries do. However, that does not necessarily mean that they cannot produce similar ratio levels. Horvath, et al, found higher levels of liquidity creation in small Czech banks, which may suggest similar findings here (Horvath et al, 2013). The lack of previous empirical studies in similar environments makes it difficult to gauge. However, given the general lack of strong regulatory and supervisory frameworks, and the subsequent need of MFIs to hold on to higher amounts of liquid capital to absorb shock, I expect both pure and ratio levels of LC to be lower in microfinance than in traditional banking.

H2a: Capital is expected to be negatively correlated with levels of LC.

In literature, conflicting theories on the effect of capital on liquidity exist. Some studies, such as Bhattacharya and Thakor (1993), argue that higher levels of capital mitigates risk, and increases the risk-bearing capacity of the intermediary, thus increasing levels of liquidity creation. Other literature, however, finds that this is only true for very large banks, due to increased regulatory scrutiny (Berger and Bouwman, 2009). In the 2006 study by Gatev and Strahan, the yielded results are inconclusive: they find that higher capital ratios are associated with higher loans and deposits, but also associated with more liquid assets and illiquid liabilities (Gatev and Strahan, 2006). Still other literature suggests that the relationship between capital and liquidity creation is negative. The lack of deposit insurance is suggested to cause a situation in which the intermediary needs to fear potential bank runs, but deposit contracts are able to mitigate the potential hold-up challenge (Diamond and Rajan, 2001). Because investors cannot run on the bank, they are less willing to provide funds, thus reducing levels of liquidity creation (Berger and Bouwman, 2009).

The empirical findings of more recent studies support the latter theory, showing consistent and significant negative relationships between liquidity creation and capital, especially for

smaller banks (e.g. Berger and Bouwman 2009; Horvath et al. 2013; Fidrmuc et al. 2015; Genetay et al., 2015; Fungacova et al., 2017). In line with these results, I therefore expect that capital is negatively correlated with LC in microfinance institutions.

H2b: Size is expected to be negatively correlated with LC.

Previous empirical literature has found a consistent negative relationship between size and liquidity creation, though significance levels have varied a good deal between studies.(e.g. Schaefer and Deep, 2004; Horvath, et al, 2013; Rauch et al., 2009; Genetay et al, 2015). Microfinance institutions are generally in the lower end of 'small banks', and no studies of liquidity creation in the sector has yet been published. However, based on the findings in traditional banking, I expect the relationship between scaled LC and size to be negative and significant, while pure values are expected to be positive.

H2c: Deposit insurance is expected to be negatively correlated with LC.

In the theory described previously, I explain how it has been suggested that the relationship between capital and liquidity creation may be negative, due to the disciplining fear of bank runs (Diamond and Dybvig, 1983). According to theory, the presence of deposit insurance removes the risk of a bank run, and with it, the incentive for the bank to not withhold effort (Diamond and Rajan, 2001). Based on this, I would expect the presence of deposit insurance to have negative and significant correlation to liquidity creation.

However, while empirical evidence is sparse, the few studies that have included the effect of deposit insurance in their studies of liquidity creation, present varying relationships and degrees of significance. Deep and Schaefer (2004) find no significant effect from deposit insurance. They argue that deposit insurance does not impact levels of liquidity transformation because the insured deposits replace uninsured liabilities, rather than increase the ratio of deposits and loans extended. Instead, they propose that the main driver of liquidity transformation should be found in the bank response to credit risk. The authors also point out that the theoretical models behind deposit contract theory

erroneously assumes that banks are financed solely by insured demand deposits, which is rarely the case (Schaefer and Deep, 2004). Roulet (2011) expands on this, arguing that deposit insurance is only relevant when explicit in its use, and visible. However, while Fungacova et al. also find no effect of deposit insurance amongst their full sample of Russian banks, they do detect a positive impact for under-capitalized banks with high household deposit ratios (Fungacova et al., 2016).

Based on the empirical findings outlined above, and the fact that microfinance institutions generally are well capitalized relative to their size, I expect the impact of deposit insurance to be insignificant.

H2d: Bank risk is expected to be negatively correlated with LC.

Following the argument by Berger et al. (2011) that a financial intermediary can create too much liquidity, if it takes undue risk, the initial expectation would be that institutions with weak values for operational self-sustainability (OSS) would have risk values which are positive and significantly correlated with liquidity creation. In recent banking literature, liquidity creation is limited to what several studies as healthy commercial banks, which excludes banks with negative equity, no outstanding loans and assets below $25M (e.g. Berger and Bouwman, 2009; Pana, 2010; Pungacova, 2010; Horvath et al., 2014; Fungacova, 2015). In the case of this study and the context of microfinance and developing financial markets, a similar definition is used, though only excluding financial institutions with GLPs below USD 1000.

For standard intermediaries with reasonably healthy performance values, the empirical evidence so far seems to find significant, negative relationships between bank risk and LC, especially for small commercial bank (e.g. Schaefer and Deep, 2004, Berger and Bouwman, 2009, Horvath et al., 2013). Based on this, I expect to find a negative and significant relationship between bank risk and levels of liquidity creation.

H2e: OSS is expected to be positively correlated with LC.

Though most empirical studies on liquidity creation do not include controls for financial performance, it is nonetheless a key factor of concern to most of the literature found on microfinance. This is because the factor speaks to the heart of one of the most discussed questions raised in the first decades of modern microfinance; namely, is microfinance really capable of remaining self-sustainable, despite the high transaction costs associated with the extension of very small loans (e.g. Cull, et al., 2007 and 2009a, Morduch, 2000). In the few cases where it has been included in traditional literature discussing liquidity creation, the most common measures used is return on assets (ROA), or return on equity (ROE).

However, in microfinance, both of these fall somewhat short of the mark, in that a significant portion of functioning, sustainable microfinance institutions are non-profit, and thus concern themselves more about long-term operational sustainability, than maximising profit. In addition, some recent literature suggests that profit-status may not be indicative of the institution's ability to secure profit (e.g. Mersland, 2009; Hartarska and Mersland, 2012; Nghiem, 2007; Lützenkirchen, 2012). For this reason, I use operational self-sustainability to measure to control for MFI performance.

Long-term sustainability is required to successfully continue to extend loans, since donations and grants are typically fickle and vary greatly in size from year to year. For this reason, especially given my focus on deposit-taking institutions, I expect OSS to be positively correlated with LC.

4.3. Methodology

In the following section, I present the measurement used to calculate levels of liquidity in microfinance, and discuss the choice of model. I present the regression framework used to estimate the impact of capital, size and deposit insurance upon liquidity creation, and explain the choice of covariates included.

4.3.1. Measuring Liquidity in Microfinance

I adapt empirical models developed by previous literature to the unique conditions of the microfinance industry, using Berger and Bouwman's 'cat non-fat' measurement of liquidity creation in US banks as outset (Berger and Bouwman, 2009).[37] The measurement used to calculate liquidity creation, is as follows:

Equation 4.1: Calculation of Liquidity Creation

LC = 0.5 * illiquid assets + 0 * semi liquid assets - 0.5 * liquid assets + 0.5 * liquid liabilities + 0 * semi liquid assets - 0.5 * illiquid liabilities

Following the assumption that liquidity is created when liquid liabilities are transformed into illiquid assets, the model for liquidity calculation classifies assets and liabilities based on their levels of liquidity, and assigns weights according to the Berger and Bouwman model for calculating LC in traditional banks. This includes calculating the compound values for the 3 levels of liquidity (liquid, semi-liquid and illiquid), on both sides of the balance sheet, and assigning weights to each. The Berger-Bouwman methodology used in this study calculates liquidity creation by classifying the level of liquidity according to the ease, time and cost for a customer to obtain liquid funds, as well as the ease, time and cost for the bank to dispose of their obligations to meet demands.[38]

Asset Classifications

On the asset side of the balance sheet, business loans and micro-business loans are thus classified as illiquid regardless of maturity, due to the difficulty that the institution will have in disposing of the loans.

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[37] Ideally, I would have liked to control this with an alternative maturity measure, derived from the empirical model for measurement of liquidity gap by Deep and Schaefer (2004) as well, but the data available on loan maturities in microfinance is still too sparse and unreliable to derive any meaningful results from them.

[38] Berger and Bouwman's alternative model, mat non-fat, classifies loan categories entirely based on their maturity. This has, for example, importance for the majority of the micro-business loans, which would be classified as semi-liquid, due to their relatively short maturities. However, in terms of the ease, time and cost for the MFI to reclaim their funds in cases of default, I choose to categorise the loans as illiquid, due to the high level of complexity involved in retrieving collateral-free loans (Berger and Bouwman, 2009).

Agricultural loans are also classified as illiquid, because microfinance loans in agriculture are almost entirely seasonal, which, when lending without collateral, makes the institution entirely dependent on a successful harvest. If the harvest fails, it is near-impossible for the institution to ensure repayment.

Table 4.1: Asset Classification

Illiquid assets (weight = ½)	Semi-liquid (weight = 0)	Liquid assets (weight -½)

Loans to micro-businesses
Agricultural loans
Fixed assets
Loans to Corporations
  -   Loans to SME
  -   Loans to large corporations
Education loans
Intangible assets
Other assets
	Retail loans, including:
	  - Household Financing loans
	  - Consumption loans
	  - Retail/Mortgage loans
	
	Loans to governmental institutions
	Loans to financial institutions
		Cash and equivalents
		Securities

Educational loans are also classified as illiquid, due to their difficulty in reclaiming the payment in case of default, as well as because of their relatively long maturities.

Finally, fixed and intangible assets are also listed as illiquid, due to the level of 'ease, time and cost' for the institution to dispose of these to meet potential liquidity demands.

The semi-liquid asset compound contains assets in which the level of liquidity is considered neutral in terms of its creation or destruction of liquidity for the market. This category includes household financing, consumption and mortgage loans, which have a lower ease, time and cost value for the institution, since the purchases can be repossessed. Similarly, loans to other financial and governmental institutions, while very rare in MFIs, are classified as semi-liquid, due to the relative ease with which the institution can reclaim the funds.

Liquid assets include cash and cash equivalents and what few securities the MFI may have, since these can be used to immediately meet potential liquidity demands.

Liabilities Classification

On the liabilities side, ordinary deposits are classified as liquid, due to the relative ease and low cost for the customer to retrieve their funds. Time deposits, however, are classified as semi-liquid, since they are harder and often more costly to retrieve for the customer. MFI borrowings, which are loans taken by the MFI, with short or medium term maturities, are also considered semi-liquid. Illiquid liabilities cover any form of liabilities which cannot easily be withdrawn. This includes subordinated debt, following the classification of Berger and Bouwman (2009). Also classified with illiquid liabilities is equity, due to the inability of investors to demand liquid funds against it. Due to lack of available data, off-balance sheet guarantees are not defined.

Table 4.2: Liabilities Classification

Liquid liabilities (weight ½)	Semi-liquid (weight = 0)	Illiquid liabilities (weight -½)
Deposits	Time deposits Borrowings	Subordinated debt Equity incl. donations

Donations are included on both sides of the balance sheet, though not defined as a post by itself. On the asset side, donations are embedded into cash and cash equivalents, while they are listed as part of equity on the liabilities side.

4.3.2. Determinants of Liquidity Creation

In addition to studying the ratio levels of liquidity creation in microfinance, I estimate the impact of traditional bank characteristics upon levels of liquidity created in MFIs. I am interested to know whether the drivers of liquidity found measured in traditional banking literature, such as capital, size, deposit insurance and bank risk, yield similar results for the microfinance sector. However, due to the unique conditions under which the MFIs operate, I also control for certain special development characteristics, such as non-governmental status (NGO) and country-level human development index (HDI) values.

All estimations use panel data to run fixed effects estimations, in which the independent variables have been lagged one-period to minimize endogeneity concerns. In addition, I use a robust clustering methodology at MFI level with my estimations, to address both concerns of heteroscedasticity, as well as possible serial correlation across observations from same microfinance intermediary. Variance inflation factor (vif) values are all between 1.05 and 2.4, with a mean of 1.46, indicating no significant presence of multicollinearity[39]. Observations from same MFI are likely to be correlated, and for this reason, OLS regressions carry the risk of overestimating levels of significance, by underestimating errors. I include fixed effects for time and country.

The choice of the fixed effects model was made based on results of the Hausman specification test, which returned values between 0.000 and 0.024. The Hausman test is conducted to test for significant differences in coefficiency between fixed and random models (Dougherty, 2011). The approach is particularly appropriate when exogenous and time-invariant variables may be correlated (Woolridge, 2002; Hartarska and Nadolnyak, 2007). In addition, Prob < F returned values below 0.05 as well, suggesting that a fixed effects model, including time fixed effects, is appropriate.[40]

To investigate the relationship between capital, size, deposit insurance and levels of liquidity created by the MFI, I estimate the following fixed effects model:

Equation 4.2: Liquidity Creation and Deposit Insurance, DV I-III

$$LIQ_{it} = \alpha + \beta_k CAPITAL_{kit-1} + \delta_2 it - 1 + \delta_3 REG_{it} + \delta_4 NGO_{it} + \delta_5 RISK_{it-1} + \delta_6 OSS_{it-1}$$
$$+ \delta_7 DEPINS_{it} + \delta_9 AGE_{it} + \delta_{10} GDPP_{it} + \delta_{11} INFL_{it} f_j + \delta_{12} HDI_{it} + f_j + T_i + \varepsilon_{it}$$

, where $CAPITAL_{kit-1}$ captures the effect of capital on levels of liquidity creation in MFI i for period t. Capital is measured as the one-period-lagged proportion of equity to assets,

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[39] In addition to the vif test, correlation matrices were created for all regressions in the dissertation, with upper limits set to 0.4. As can be seen in Appendix E, no correlation among the independent variables breaches this limit.

[40] However, results are statistically significant and qualitatively the same, using either random GLS or fixed effects estimations.

referencing a substantial body of research (e.g. Diamond and Dybvig 1983; Diamond and Rajan, 2001; Berger and Bouwman, 2009; Horvath and Seidler, 2013).

LIQ measures of liquidity creation of MFI i in period t, and comprises of the following 4 measurements: pure, absolute liquidity creation (LC), LC scaled by total assets (LC_GTA), LC to equity (LC_E) and LC as a proportion of total loans (LC_GLP). Pure LC has been deflated using the World Bank's Consumer Price Index (CPI).

I include a time trend (T_i) to capture any banking-related methodological changes over the time. ε is a stochastic error term. α is a constant term. β and δ are the unknown coefficients to be estimated. The subscripts *i* and *t* refer to MFI and time, respectively.

In the model, $it - 1$ is included to capture effect of MFI size across institutional types and ages, for MFI i in period t. Size is measured as the one-period-lagged log of total assets.[41]

I control for the age of the MFI, calculated as a log of year t minus the years of establishment (AGE). The level of bank risk present in the MFI, is measured as the one-period-lagged ratio of portfolio at risk > 30 days to the MFI's gross loan portfolio (RISK).

To measure the financial self-sufficiency of the MFI as an indicator of financial performance, I control for the level of operational self-sufficiency (OSS). OSS is calculated as

Equation 4.3: Operational Self-Sufficiency

$$\frac{\textbf{Financial revenue}}{\textbf{(financial expense + impairment loss +operating expense)}}$$

In addition, 4 dummy variables are included. The values indicate whether the MFI is a non-profit organisation (NGO), and whether the MFI is regulated by a state banking supervisory

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[41] Ideally, I would have liked to measure size as number of active borrowers as well, but this was not possible due to data limitations.

agency (REG).[42] Finally, to control for the presence of whether deposit insurance (DEPINS), I use values from Barth et al.'s Index, developed using 4 World Bank surveys from 1999, 2003, 2007 and 2011 (Barth et al, 2013).[43]   DEPINS is a dummy, measured as *"…whether there is an explicit deposit insurance scheme and whether depositors were fully compensated the last time a bank failed*." (Barth et al, 2013:14).[44]

Table 4.3: Variables and Definitions

Variable	Definition
Liquidity creation (log)	Log of the pure liquidity creation value, deflated using the CPI Index.
LC/GTA	Liquidity creation scaled by size.
LC/E	Liquidity creation scaled by equity.
LC/GLP	Liquidity creation scaled by total loans.
Capital	Measured as the ratio of equity to total assets.
Regulation (dummy)	Dummy indicating whether the individual MFI is regulated.
Size (log)	Measured as a log of the MFI's total assets.
Age	Age of MFI, measured a number of years since year of establishment.[45]
NGO (dummy)	Dummy variable taking the value 1, if the MFI is registered as an NGO.
Bank risk	Bank risk, measured as the ratio of portfolio at risk, 30 days.
Operational self-sufficiency	Ratio of financial revenue divided by financial and operating expense, and impairment loss.
Deposit insurance (dummy)	Dummy denoting whether the country has explicit deposit insurance. (source: Bath et al, 2013)
GDP growth per capita	Measure of GDP growth per capita (source: World Bank)
Inflation	% change of the GDP deflator (source: World Bank)
HDI	Human Development Index, measured by the UN. Source: UNDP

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[42] The impact of non-governmental status and strategy has also been measured using profit-status instead. Results yielded qualitatively similar results, though with lower R-square.

[43] Deposit insurance was also measured with a ratio value, from same index. Both variables returned results rejecting the financial fragility hypothesis, returning results which were either insignificant or inconsistently positive.

[44] In the original index, the value measures NODEPINS, giving values of 1 when there is no explicit deposit scheme. In this study, the values have been reversed, so 1 denotes the presence of deposit schemes, instead of the absence.

[45] While not included here, I have run estimations including age-squared, to test for a non-linear relationship. The results are qualitatively the same; negative with weak and inconsistent significance.

Three additional macroeconomic variables are introduced, to control for the local economic market conditions of the MFIs. I include GDP growth per capita (GDPP) and inflation (INFL).

Some literature has argued that in the context of development countries, GDP is inadequate to measure the macroeconomic conditions on its own (Cull et al., 2007). Furthermore, Gorton and Winton suggest that the development of institutions and legal framework is important to the state of financial institutions in development regions (Gorton and Winton, 2002). For this reason I also include the UN's human development index (HDI). The HDI index is calculated using a number of development-specific values, including life expectancy, education and income per capita.

I measure liquidity creation using a cross-country approach, but recognise that there is likely to be major differences in the creation of liquidity between regions. For this reason, I include a fixed effect to control for the impact of differences between key regions. f_j is a vector of regional dummies, included to capture unobserved geographical characteristics over time: Sub-Saharan Africa (SSA), Middle East and North Africa (MENA), Eastern Europe and Central Asia (EECA), East Asia and Pacific (EAP), South Asia (SA) and Latin America (LAC).

Correlation matrices were created to check for autocorrelation and multicollinearity between the independent variables (please see Appendix E).

4.4. Data

My sample data has been collected from the Microfinance Information eXchange (MIX) database, which is maintained by a non-profit private organisation, aiming to increase the quality of information on microfinance institutions for the industry. My database covers 3800 MFIs, with observations from 2004 to 2012, in 118 countries. The coverage in 2012 is about 12.5% of the estimated 10,000 MFIs currently in existence, and about 50% of all borrowers. While 12.5% of the full population of microfinance institutions can seem low, it should be noted that the top 10% MFIs hold 86.2% of all assets, so coverage in terms of assets is estimated to be well over 90% (MIX, 2013).

The initial cleaning of duplicates, empty data points and faulty data resulted in a combined data pool of 10441 usable observations, of which 3672 observations from 1121 MFIs are from deposit-takers with diamond ratings 4-5.[46] The data includes traditional balance sheet items on both asset and liability categories, as well as data on group lending methodologies and profit-status. All values are winsorized at 1 and 99% to eliminate outliers[47].

The data available has varying levels of reliability, depending on the levels of regulation and quality of audit performed on the specific MFI. To address this, a large number of studies using the MIX database only use relatively small samples (often just 2-300 observations) of the full database, and often limit that sample to only include large, well-established institutions.

This study excludes MFIs with less than 1000 USD in assets, and attempts to increase the quality and validity of the data employed, by limiting the data sample to MFIs with diamond ratings 3 to 5. The diamond rating reflects the quality of data received, as well as the underlying degree of audit and documentation. Diamond rating 3 denotes documented financial data, while 4 and 5 are fully audited. Because liquidity creation specifically happens through the transformation of liquid liabilities to illiquid assets, the sample is limited to deposit-taking institutions. Finally, I eliminate any microfinance institution with negative equity, on the basis that a near-insolvent institution is likely to focus on securing short-term capital, and is likely to change its behaviour and investment strategies accordingly.

The data available in MIX is provided on a voluntary basis from the microfinance providers, which is bound to skew the data toward institutions with stronger performance than the average. It is unknown whether the same skewing also affects the type of institutions primarily represented in the database. However, one could argue that for-profit institutions with poor performance may be less incentivised to participate than institutions with strong performance, or those with a social agenda in which financial performance is considered less of a priority than levels of poverty alleviation achieved (Cull et al., 2009).

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[46] This refers, for example, to cases where 0 is not a true 0, but has been set in a category not used, instead of left blank. It also includes cases where sub- and super categories do not add up.

[47] All data treatment and regression work has been done using Stata, version 11 and 15.

Table 4.4: MFI Summary Statistics

2004 - 2012	Number of Observations	Mean	Standard Deviation	Minimum	5th Percentile	Median	95th Percentile	Maximum
Dependent Variables:								
Liquidity Creation (Deflated)	3672	14.45 M	30.75 M	0.00 M	0.08 M	2.62 M	78.76 M	293.22 M
Liquidity Creation (Deflated) SML	1880	1.09 M	1.17 M	0.00 M	0.03 M	0.67 M	3.49 M	9.35 M
Liquidity Creation (Deflated) MED	1487	14.92 M	15.45 M	0.05 M	1.70 M	9.00 M	47.41 M	116.00 M
Liquidity Creation (Deflated) LGR	305	94.53 M	53.01 M	1.49 M	19.57 M	86.71 M	195.74 M	293.22 M
Liquidity Creation / Gross Total Assets	3672	0.33	0.16	0.02	0.07	0.33	0.61	0.75
Liquidity Creation / Gross Loan Portfolio	3672	0.47	0.26	0.02	0.10	0.44	0.94	1.45
Liquidity Creation / Equity	3672	2.09	1.77	0.03	0.16	1.66	5.85	8.39
Independent Variables:								
Capital	3672	0.25	0.17	0.02	0.08	0.19	0.61	0.97
Deposit Insurance	3053	0.33	0.47	0.00	0.00	0.00	1.00	1.00
Risk	3194	0.07	0.10	0.00	0.00	0.04	0.23	1.00
Size	3672	15.96	1.90	7.17	12.96	15.87	19.25	19.97
Age	3672	5.83	3.05	1.00	2.00	6.00	11.00	14.00
Regulation	3672	0.74	0.44	0.00	0.00	1.00	1.00	1.00
Profit Status	3672	0.44	0.50	0.00	0.00	0.00	1.00	1.00
GDP Growth per capita	3368	5.56	2.84	-7.07	1.05	5.57	10.26	17.29
Inflation	3323	8.12	5.55	-2.60	1.62	6.65	19.41	33.54

However, the introduction of common reporting in 2013 is meant to streamline the reporting process for MFIs and auditing companies around the world (MIX, 2013). The review and validation process has deepened especially the last few years, and now includes 135 quality checks, as well as perform routine internal auditing of the data, using 150 audit factors (MIX, 2013).[48]

4.5. Results

The levels of liquidity created by microfinance institutions have increased continuously in the recorded period, from $USD1.4Bn in 2004, to 6.5Bn in 2012, after deflation.[49] The overall amount of liquidity observed for 2012 is slightly lower than in 2011, but average amounts created per MFI continues to increase, from 9.07M in 2004, to 16.8M in 2011 and 17.26M in 2012. The total amount of liquidity created since 2004 is $US 50Bn. (table 4.7).

Table 4.5: Liquidity Creation, Across Years

	Total Liquidity Created	Average Liquidity Created	Average Liquidity/Gross Total Assets
2004	$1,396.70 M	$9.07 M	0.33
2005	$2,759.68 M	$10.15 M	0.31
2006	$3,921.66 M	$10.27 M	0.34
2007	$5,202.22 M	$11.93 M	0.35
2008	$6,132.79 M	$12.14 M	0.31
2009	$6,441.72 M	$12.91 M	0.32
2010	$8,090.01 M	$15.83 M	0.32
2011	$8,987.34 M	$16.80 M	0.34
2012	$6,524.26 M	$17.26 M	0.36

The absolute amounts of liquidity created by the MFIs vary greatly from institution to institution, which, given both organizational and size differences between established commercial banks and local non-profit initiatives, is to be expected. However, when liquidity is scaled by total assets, most institutions in the past 10 years fall within a ratio bracket between 0,3 and 0,4 (table 4.5 and 4.6).

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[48] The audit rules used by MIX include factors such as checking the balance of financial statements, and whether ratios are particularly high or low compared to its competitors.

[49] All pure values are in USD, and are deflated across the years using the CPI Index.

Table 4.6: Summary Statistics by Type, 2004-2012

2004 - 2012	Number of Observations	Mean	Standard Deviation	Minimum	5th Percentile	Median	95th Percentile	Maximum
Dependent Variables:								
Liquidity Creation (Deflated)	3672	13.25 M	28.01 M	0.00 M	0.00 M	2.25 M	73.68 M	157.95 M
Liquidity Creation / Gross Total Assets	3672	0.33	0.16	0.02	0.07	0.33	0.61	0.75
Liquidity Creation / Gross Loan Portfolio	3672	0.47	0.26	0.02	0.10	0.44	0.94	1.45
Liquidity Creation / Equity	3672	2.09	1.77	0.03	0.16	1.66	5.85	8.39
Liquidity Creation by Type:								
Bank	492	45.55 M	52.71 M	0.00 M	0.13 M	23.26 M	152.70 M	293.22 M
Credit Union / Cooperative	846	9.74 M	21.19 M	0.00 M	0.06 M	2.03 M	49.74 M	174.80 M
NBFI	898	17.11 M	30.09 M	0.00 M	0.12 M	4.09 M	81.46 M	205.83 M
NGO	923	5.16 M	16.63 M	0.00 M	0.05 M	1.14 M	18.91 M	250.65 M
Rural Bank	454	4.62 M	6.93 M	0.00 M	0.15 M	2.02 M	18.17 M	49.40 M
Other	27	1.84 M	3.33 M	0.01 M	0 04 M	0.46 M	11.85 M	11.92 M

These values are generally higher for MFIs than for traditional banks: Berger and Bouwman found average ratios for LC/GTA of just 0.19 for US banks using their corresponding cat non-fat measure, while Horvath et al. observed averages from 0.16 in the mid-2000s, to 0.36 in mid-2010, for their sample of Czech banks (Berger and Bouwman, 2009: 3800; Horvath et al. 2013:352).

Across all institutional types, the larger institutions create the largest amounts of liquidity, and liquidity creation scaled by size shows average ratio values falling between 0.28 and 0.34 (table 4.7).

The growth rate of liquidity created to the growth rate of total assets is significantly higher in smaller MFIs than in medium-sized and larger institutions (table 4.7). Similarly, the control variable for size generally appears to be negatively correlated with levels of liquidity created by the MFIs across different models and measurements for scaled LC.

Table 4.7: Average Liquidity Creation by MFI Size, 2004-2012

	Average LC/GTA	GTA Growth	LC growth	LC/GTA Growth
Small	0.33	4.36	5.40	1.24
Medium	0.28	3.74	4.11	1.10
Large	0.34	8.12	9.01	1.11

The same appears to be true when taking a closer look at organizational types: while commercial banks, which hold 42.58% of all MFI assets, create 31.30% liquidity to total assets, credit unions and rural banks, which hold just 15.78% and 3.4% of all assets respectively, create 36.6% and 36.48% liquidity to total assets held (table 4.8).

Table 4.8: MFI Characteristics by Type, all Years

2004 - 2012	Bank	Credit Union / Cooperative	NBFI	NGO	Rural Bank	Other
Unique MFIs	145	291	258	280	135	12
Observations	492	846	898	923	454	27
% of Total Assets	42.58%	15.74%	29.34%	8.62%	3.40%	0.12%
% of Total Branches	13.52%	23.24%	24.67%	25.36%	12.47%	0.74%
Average Size of Total Assets	$126.52 M	$27.20 M	$47.77 M	$13.66 M	$10.94 M	$6.68 M
Average Size of Equity	$18.81 M	$5.10 M	$8.15 M	$3.82 M	$1.55 M	$1.74 M
Total Loan Volume	$42,933.48 M	$16,946.14 M	$33,497.68 M	$9.821.92 M	$3,278.16 M	$117.43 M
Total Deposit Volume	$32,419.17 M	$14,254.36 M	$21,552.31 M	$3.355.46 M	$2.880.68 M	$84.58 M
Average Liquidity Created	$42.09 M	$9.43 M	$16.0614	$4.63 M	$4.16 M	$2.01 M
Change in Liquidity	47.77%	64.63%	43.25%	125.88%	11.61%	0.00%
Liquidity as % of Assets	31.30%	36.60%	30.77%	31.82%	36.48%	30.79%

Table 4.9: Top Liquidity Creators, by Country

Top 5 (by LC)	Mean							Ranking			Percentage of Population			
Country	Assets	Deposits	Liquidity Creation	Liquidity Creation / Gross Total	Liquidity Creation / Gross Loan	Liquidity Creation / Equity	Liquidity Creation / Deposits	Assets	Deposits	LC / GTA	Assets	Deposits	Liquidity Creation	LC / GTA
Ukraine	$294.80 M	$137.50 M	$117.00 M	0.36	0.43	4.08	1.08	2	3	16	6.45%	5.98%	8.01%	1.51%
Romania	$324.90 M	$170.60 M	$95.60 M	0.28	0.38	3.28	0.59	1	1	45	7.11%	7.42%	6.54%	1.18%
Azerbaijan	$221.60 M	$90.67 M	$75.10 M	0.37	0.53	2.40	1.60	4	6	15	4.85%	3.95%	5.14%	1.53%
Bosnia and Herzegovina	$248.60 M	$124.10 M	$66.20 M	0.28	0.37	2.70	0.58	3	4	48	5.44%	5.40%	4.53%	1.16%
Brazil	$216.40 M	$69.94 M	$59.50 M	0.26	0.54	1.55	1.23	5	10	54	4.74%	3.04%	4.07%	1.09%

Table 4.10: Bottom Liquidity Creators, by Country

Bottom 5 (by LC)	Mean							Ranking			Percentage of Population			
Country	Assets	Deposits	Liquidity Creation	Liquidity Creation / Gross Total	Liquidity Creation / Gross Loan	Liquidity Creation / Equity	Liquidity Creation / Deposits	Assets	Deposits	LC / GTA	Assets	Deposits	Liquidity Creation	LC / GTA
Sierra Leone	S0.92 M	$0.19 M	$0.18 M	0.20	0.27	1.02	1.12	79	78	71	0.02%	0.01%	0.01%	0.85%
Yemen	$1.26 M	$0.18 M	$0.24 M	0.19	0.25	0.79	3.55	77	79	72	0.03%	0.01%	0.02%	0.80%
Zambia	$3.24 M	$0.52 M	$0.43 M	0.13	0.22	0.34	0.99	75	75	77	0.07%	0.02%	0.03%	0.54%
Namibia	$1.00 M	$0.26 M	$0.47 M	0.31	0.46	1.58	3.89	78	77	36	0.02%	0.01%	0.03%	1.30%
Egypt	$3.01 M	$0.28 M	$0.61 M	0.21	0.29	1.40	11.24	76	76	70	0.07%	0.01%	0.04%	0.86%

Table 4.11: Top LC Creators (Scaled by Size), by Country

Top 5 (by LC / GTA)	Mean							Ranking			Percentage of Population			
Country	Assets	Deposits	Liquidity Creation	Liquidity Creation / Gross Total	Liquidity Creation / Gross Loan	Liquidity Creation / Equity	Liquidity Creation / Deposits	Assets	Deposits	LC / GTA	Assets	Deposits	Liquidity Creation	LC / GTA
Chile	$21.84 M	$7.96 M	$7.88 M	0.59	0.68	1.38	2.77	45	46	45	0.48%	0.35%	0.54%	2.48%
Togo	$24.70 M	$18.96 M	$14.30 M	0.59	0.79	4.73	0.97	43	38	32	0.54%	0.83%	0.98%	2.46%
South Sudan	$65.45 M	$48.54 M	$51.80 M	0.53	2.32	4.49	1.96	23	16	8	1.43%	2.11%	3.54%	2.21%
Venezuela	$79.47 M	$39.38 M	$41.80 M	0.51	0.62	4.24	1.20	18	19	12	1.74%	1.71%	2.86%	2.14%
Gambia	$4.62 M	$3.41 M	$2.24 M	0.41	1.01	3.28	0.75	69	60	64	0.10%	0.15%	0.15%	1.72%

Table 4.12: Bottom LC Creators (Scaled by Size), by Country

Bottom 5 (LC / GTA)	Mean							Ranking			Percentage of Population			
Country	Assets	Deposits	Liquidity Creation	Liquidity Creation / Gross Total	Liquidity Creation / Gross Loan	Liquidity Creation / Equity	Liquidity Creation / Deposits	Assets	Deposits	LC / GTA	Assets	Deposits	Liquidity Creation	LC / GTA
Papua New Guinea	$15.16 M	$12.39 M	$2.34 M	0.12	0.54	1.57	0.14	51	42	61	0.33%	0.54%	0.16%	0.50%
Syria	$11.71 M	$0.75 M	$1.43 M	0.13	0.14	0.24	6.45	56	74	70	0.26%	0.03%	0.10%	0.54%
Zambia	$3.24 M	$0.52 M	$0.43 M	0.13	0.22	0.34	0.99	75	75	77	0.07%	0.02%	0.03%	0.54%
Serbia	$96.39 M	$38.16 M	$23.10 M	0.16	0.23	1.05	0.61	16	21	21	2.11%	1.66%	1.58%	0.66%
Palestine	$69.96 M	$49.40 M	$13.70 M	0.16	0.41	0.62	8.08	20	15	36	1.53%	2.15%	0.94%	0.67%

Table 4.13: Liquidity Creation by Region

LC by Region	Mean							Ranking		
Country	Assets	Deposits	Liquidity Creation	Liquidity Creation / Gross Total Assets	Liquidity Creation / Gross Loan Portfolio	Liquidity Creation / Equity	Liquidity Creation / Deposits	Assets	Deposits	Liquidity Creation
Eastern Europe and Central Asia	$95.28 M	$44.97 M	$25.50 M	0.28	0.37	2.02	4.18	1	1	1
Latin America and The Caribbean	$68.69 M	$39.48 M	$24.70 M	0.34	0.44	2.08	8.69	2	2	2
South Asia	$28.14 M	$9.84 M	$9.87 M	0.36	0.46	3.02	22.25	3	5	3
Sub-Saharan Africa	$22.76 M	$12.77 M	$9.50 M	0.33	0.60	1.87	1.26	4	3	4
East Asia and the Pacific	$14.31 M	$5.48 M	$4.44 M	0.34	0.47	1.87	205.65	6	6	5
Middle East and North Africa	$22.59 M	$12.48 M	$0.65 M	0.18	0.28	0.82	8.85	5	4	6

Table 4.14: Liquidity Creation by Region, Scaled by Size

LC / GTA by Region	Mean							Ranking		
Country	Assets	Deposits	Liquidity Creation	Liquidity Creation / Gross Total Assets	Liquidity Creation / Gross Loan Portfolio	Liquidity Creation / Equity	Liquidity Creation / Deposits	Assets	Deposits	LC / GTA
South Asia	$28.14 M	$9.84 M	$9.87 M	0.36	0.46	3.02	22.25	3	S	1
East Asia and the Pacific	$14.31 M	$5.48 M	$4.44 M	0.34	0.47	1.87	205.65	6	6	2
Latin America and The Caribbean	$68.69 M	$39.48 M	$24.70 M	0.34	0.44	2.08	8.69	2	2	3
Sub-Saharan Africa	$22.76 M	$12.77 M	$9.50 M	0.33	0.60	1.87	1.26	4	3	4
Eastern Europe and Central Asia	$95.28 M	$44.97 M	$25.50 M	0.28	0.37	2.02	4.18	1	1	5
Middle East and North Africa	$22.59 M	$12.48 M	$0.65 M	0.18	0.28	0.82	8.85	5	4	6

4.5.1. LC by Country and Region

With a dataset reaching across regional and national borders, there are bound to be significant differences in the amounts of liquidity created by the institutions in each region, given the varying levels of financial infrastructure, development and regulation. As tables 4.9 and 4.10 show, the top countries in terms of absolute deflated liquidity creation, are found almost exclusively in Eastern Europe and Central Asia (EECA) and Latin America (LAC), with an average of $USD25.5M and 24.7M per MFI/year for each region (table 4.9-4.14).

Regionally, the mean value of LC, when scaled by assets, is stable across all regions with figures from 0.28 to 0.36, with only the Middle Eastern region lagging behind at 0.18 (Table 4.13 and 4.14). With regard to the Middle East and North Africa, it is worth noting that the amount of observations available is significantly lower than for the other five regions, adding some uncertainty to the results. In terms of pure LC, Latin America and Eastern Europe tops the list, producing between 2.5 and 5 times as much liquidity for the market as the remaining regions.

While there appears to be little geographical divergence between regions when LC is scaled by size of the MFI (tables 4.07 and 4.9), there is a significant gap in the average amount of liquidity created between the individual countries at the top and bottom of the scale, a difference which remains prominent when the MFIs are scaled by size (tables 4.19 - 4.10).

The difference may be explained by the positive and significant correlation found between state regulation and levels of LC, discussed in more detail in chapter 6. Both Latin America and Eastern Europe have better-developed regulatory systems, including functioning credit registries and meso-level institutions put in place to help the MFI sector prosper. While Eastern Europe and Latin America appear to be firmly placed in the top of both pure deflated LC and LC values scaled by assets, the picture is more muddled for Africa, where the microfinance industry is still finding its footing. Given the relative youth of the industry, and the relatively weak level of participation of formal, commercial banks and NBFIs, it is not a surprise that African nations dominate the list of bottom 5 nations, in terms of pure liquidity created. However, when the numbers are scaled by size, country-level differences begin to emerge, with Togo and Gambia showing in the top, while Zambia still remains in the bottom.

4.5.2. Estimation Results

In general, the estimations show correlation patterns which are similar to those found in previous literature. However, there are a number of key differences, which both challenge the explanations typically put forth for the relationships, and suggest further study of drivers unique to the microfinance industry.

Capital and Deposit Insurance

The findings show a very strong and consistent negative relationship between capital and liquidity creation in microfinance. This is in line with findings from previous literature from traditional banking literature, which has suggested that smaller institutions are negatively correlated with capital, due to the financial fragility hypothesis (e.g. Berger and Bouwman 2009, Horvath et al., 2013). Capital reduces the financial fragility of the MFI, which in turn reduces the level of liquidity created, due to enhancement of the bank's bargaining power, and reduction in its depositor trust (Diamond and Dybvig 1983; Diamond and Rajan, 2001). The resulting lack of effort on the part of the financial institution may be of particular importance to microfinance institutions, where capital may be made available to the institution for social reasons, in the form of either donations or heavily subsidized loans from state or donor agencies.

However, my findings also show an insignificant (and consistently positive) correlation between LC and the presence of deposit insurance, which is in contradiction with Diamond and Rajan's hypothesis (table 4.19). If the lack of effort from the bank's side is to be explained by fear of bank run, I would expect deposit insurance to be highly significant and negatively correlated with liquidity creation.

Table 4.15: Estimation Results

	LC (Log)	LC/GTA	LC/E	LC/GLP
Capital	-1.637***	-0.369***	-5.681***	-0.539***
	(0.17)	(0.03)	(0.37)	(0.05)
Size	0.932***	-0.007***	-0.001*	-0.002*
	(0.02)	(0.00)	(0.06)	(0.01)
Regulation (Dummy)	0.153***	0.035***	0.225***	0.039*
	(0.06)	(0.01)	(0.12)	(0.02)
NGO (Dummy)	-0.064	0.035**	0.496**	0.014*
	(0.09)	(0.01)	(0.21)	(0.03)
Bank Risk	-1.103**	-0.047	-0.31	-0.102
	(0.30)	(0.06)	(0.50)	(0.13)
Operational self-sufficiency	-0.036	-0.019	-0.474**	-0.056*
	(0.06)	(0.02)	(0.21)	(0.03)
Deposit Insurance (dummy)	0.012	0.015	-0.103	-0.021
	(0.05)	(0.01)	(0.10)	(0.02)
Age	-0.001	0.000	-0.003	-0.002**
	(0.00)	(0.00)	(0.00)	(0.00)
GDP Growth per Capita	-0.014**	-0.002	0.001	-0.007**
	(0.01)	(0.00)	(0.02)	(0.00)
Inflation	-0.002	-0.001**	-0.008*	0.001
	(0.00)	(0.00)	(0.02)	(0.00)
HDI Index	0.109	0.152	0.394	0.154
	(0.42)	(0.10)	(0.86)	(0.19)
Constant	-0.932**	0.434***	3.644***	0.544***
	(0.39)	(0.07)	(0.71)	(-0.15)
R2	0.87	0.22	0.41	0.24
RD Adjusted	0.86	0.21	0.4	0.23
Probability F > 0	0.00	0.00	0.00	0.00
Root MSE	0.68	0.14	1.30	0.22
dfres	607	607	607	607
BIC	3955.0	-2022.9	6395.0	-295.7
Number of Observations	1860	1860	1860	1860

Stars *, ** and *** indicate statistical significance at 10, 5 and 1%, respectively. Country-level fixed effects estimations with clustering at firm level. Robust standard errors are reported in brackets. LC is pure values of liquidity creation, deflated using the Consumer Price Index (CPI). LC/GTA is LC scaled by total assets. LC/E is LC divided by equity. LC/GLP is LC divided by gross loan portfolio. Capital is measured as equity ratio, size and age are logs of assets and years since establishment, bank risk the portfolio at risk for 30 days (PAR30). Regulation, NGO and deposit insurance are dummies, indicating whether the MFI is formally regulated, and is for-profit and operates in a market with existing deposit insurance. Operational self-sufficiency (OSS) is the ratio of financial revenue divided by financial and operating expense, and impairment loss. Finally, GDP growth per capita is GDP growth per capita, Inflation is the % change in the GDP deflator, and HDI is the UN's Human Development Index.

These findings suggest that it is not the presence of deposit insurance, which cause a negative relationship between capital and liquidity creation in MFIs, but rather the tendency in microfinance for institutions to generally hold on to larger sums of capital, to ensure ability to absorb unexpected shock. The MFIs do not hold on to the capital because they are required to by regulatory legislation, but because it is the safest way to ensure against short-term financial instability, and based on the ratio levels of LC produced per asset, they do not appear to do so to the detriment of their lending activity.

Regulation

The effect of regulation, both for pure LC and scaled LC, is generally strongly significant and positive. In line with the 'risk absorption' hypothesis, regulation helps absorb some of the risk facing the MFIs, in financial markets which are generally both unstable and unpredictable. Instead of withholding effort, as has been suggested with traditional intermediaries, the MFI simply pushes harder when facing less risk, due to the presence of strong, social and developmental goals present within the organisation. That risk is lowered simply means that even more marginalised and previously unbanked customers may be reached, without taking undue risk in the process.[50]

Regulation is positively correlated with scaled LC across both regions and years, suggesting that a well-developed regulatory framework enables microfinance institutions to extend more illiquid loans to their clients. A strong regulatory framework may indicate a better developed financial framework, in which some of the key risks to loans extended in developing regions, such as lack of decent credit registries, may have been reduced.

This result is contrary to previous empirical study by Berger et al. (2011), who found that regulation is negatively correlated to levels of liquidity creation among US banks, due to its impact on bank risk taking. The difference is likely to be found in the very different macro-environments in which the institutions operate in: while the primary function of regulatory frameworks in developed financial systems is to prevent undue risk-taking, the regulatory framework in development contexts may often be to provide an enabling environment for MFIs, to increase the access to and outreach of microfinance. A stronger regulatory

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[50] The relationship between liquidity, performance and regulation is explored further in chapter 6.

framework may not necessarily hinder the activities of the MFI, as much as it helps create a framework of security and stability within which to act.

The Macro-Environment

While GDP per capita growth is generally negatively correlated with levels of liquidity creation, the Human Development Index (HDI) is positive, though both are largely insignificant in their relationship with liquidity creation. GDP per capita has before been criticised as an inadequate measuring stick in development contexts (Cull et al, 2007). This is partly because the economic disparity between social groups in most development nations is large, which causes significant disparities in the impact of GDP growth across population divides. However, the consistent negative impact of GDP per capita could be found in the nature of the microfinance industry.[51] If high GDP growth is reflected amongst the poorest segments of society (which in itself is far from a certainty), high growth may indicate a move out of immediate poverty, away from microfinance lending, and toward more traditional banking.

Instead of GDP per capita, the UN's Human Development Index may be a better measuring tool for the state of the overall macro-environment, seen from a development perspective. However, with regard to levels of liquidity created by microfinance institutions, the effect of the HDI Index is insignificant, suggesting that the primary drivers, negative and positive, are likely to be found elsewhere. The regulatory framework, for example, seems to have a much stronger correlation with liquidity creation in microfinance, possibly due to its potential for direct impact on day to behaviour within the individual institution.

Finally, a high inflation rate can make it difficult for borrower and investor to reach one another, which is why inflation generally would be expected to have a negative impact on liquidity creation. However, while negative, my findings here suggest a muted relationship between inflation and liquidity creation in MFIs, which is in line with previous literature in microfinance (see, for example, Ahlin and Lin, 2007).

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[51] Estimations were also run with real GDP values, which returned insignificant.

Size, Age and NGO-status

I find that the size of MFIs is consistently significant and negatively correlated with liquidity creation, when absolute deflated liquidity is scaled by total assets, equity or GLP. These results echo the findings in traditional banking literature, which also observed consistent negative relationships between levels of scaled LC, and the size of the intermediary. In addition, I find that the age of the MFI is only weakly correlated with liquidity creation, though results are consistently negative. The results seem to suggest that more so than age itself, the organizational structure, size and external environment has a larger impact on levels of liquidity created by the MFI.

A sort of 'reverse life-cycle' is observed for the creation of liquidity in MFIs. It may still be true, as the life-cycle theory states that MFIs tend to start out as pure NGOs in infant and young stages, but move toward more formal and developed financial institutions as they age (e.g. Helms 2006; Farrington and Abrams 2002; Bogan, 2012a). However, this shift does not come with increased levels of liquidity creation, when values are scaled by assets, equity or loan volume. Rather, size seems to be negatively correlated with LC, while NGOs seem to produce comparatively more LC than non-NGOs.

The explanation for this may be similar to that presented in the discussion of the lack of impact by deposit insurance. For non-commercial institutions, the presence of deposit insurance does not limit effort on behalf of the bank, because of the social mission associated with the successful extension of microfinance loans. Increased security means less risk for bank run for deposit-taking MFIs yes, but the aim to reduce poverty reduction encourages the institution to increase rather than decrease lending, as risk is reduced.

Bank Risk

Previous literature has suggested that there may be such a thing as an optimal level of liquidity creation, since little LC means the intermediary is not fulfilling its role as mediator between investor and loan taker, while too much LC may result in default and insolvency (Berger et al., 2011; Horvath et al, 2013). In this study, however, bank risk does not seem to significantly impact levels of scaled liquidity created by the MFI. The findings suggest a negative but generally weak or insignificant correlation between the portion of the GLP at

risk of default, and levels of liquidity creation. The weak impact may be found in contradicting effects from increased risk-taking: While undue risk results in an increase in the ratio of portfolio at risk, and with it risk of defaulting loans, higher risk also means increased LC for loans that are successful.

When frameworks and strategies are implemented which decrease risk for the MFI, portfolio at risk may be kept steady, while still increasing levels of liquidity created for the market. Some of the strategies employed by MFIs as ways to reduce risk, such as joint lending strategies, are unique to the industry, and are studied in further detail in chapter 5.

4.6. Conclusions

As microfinance becomes an ever-growing part of the financial market in developing and emerging regions, as well seeing increased use in both the EU and the US, it becomes increasingly important to understand the financial impact of microfinance institutions, and not just on the client level. The macroeconomic impact of microfinance, and the role which MFIs may play in established financial systems, is still only poorly understood.

The findings of this study show that, like traditional financial intermediaries, microfinance institutions do contribute to the creation of liquidity to the markets they operate in, on par with and in some cases exceeding, that of regular banking institutions (tables 4.5 and 4.7). Microfinance institutions have proven themselves to be not just a viable tool in the ongoing struggle to reduce poverty but also, though the use of innovative lending technologies, as a legitimate financial intermediary, capable of producing liquidity for the market and reaching previously unbanked customers, where traditional banking may not.

The fact that microfinance is not just a tool for poverty reduction and a way to reach socially and financially excluded segments of society, is an important revelation, especially as microfinance begins to spread beyond traditional development contexts and into more developed markets, on both sides of the Atlantic.

Since MFIs contribute to the creation of liquidity for the market (and, when scaled to size, appear to do so quite well), an appropriate level of regulation is needed to ensure a positive impact on the markets concerned. Given the numerous unique traits of microfinance

institutions, along with the multitude of organizational structures and funding schemes, the regulatory framework required is likely to be quite complex. However, it would be a mistake if policymakers and practitioners alike were to forget the financial impact of MFIs upon the market, and solely focus on its social virtues. As Berger notes that banks can create both too much and too little liquidity compared to the social optimum, MFIs can either help ease or worsen the financial climate, depending on how they are run and regulated (Berger et al, 2013). However, the relationship between regulation, liquidity and microfinance deserves further study, to understand what aspects of regulation and supervision impact LC the most, and in what ways. Please see chapter 6 for insight into the relationship between liquidity creation and regulation in microfinance.

Finally, the study also shows that the theoretical argument for why deposit insurance would cause the bank to potentially withhold effort does not seem to hold true with regard to microfinance institutions (Diamond and Rajan, 2001; Berger and Bouwman, 2009). The expected negative significant relationship between LC and the presence of deposit insurance was not found, and while significance varies, the relationship does appear to be consistently positive. The result supports the findings of Deep and Schaefer, who suggested that the main drivers of liquidity creation should be found elsewhere.

Deep and Schaefer suggest capital risk as a potential driver instead, but while the impact of bank risk does appear to be consistently negative, the results are not significant. Rather, the level of liquidity creation appears to be linked to industry-specific and macroeconomic conditions, such as the state of the 'enabling environment' surrounding the MFI, as well as the presence of a social mission to keep bank efforts up. In addition to these, the following chapter takes a closer look at the drivers of LC in microfinance, and specifically evaluates the lending practices and methodology employed by MFIs, and their unique ability to reduce risk for the intermediaries.

5. Drivers of Liquidity Creation in Microfinance

In the previous chapter, I showed how microfinance institutions are able to create liquidity for the markets they operate in, at levels on par with, and sometimes better than, more traditional financial intermediaries. I also observed similar correlations between standard drivers, such as capital and size, to that found in more traditional banking literature (e.g. Berger and Bouwman, 2009; Horvath et al., 2013).

However, the successful operation of microfinance institutions relies on a unique set of lending approaches. These enable the institutions to extend loans to clients otherwise considered to be unsafe, due to their lack of adequate collateral, and the general lack of a strong 'enabling environment' in the markets they operate in. For that reason, it is plausible to expect that the main drivers of liquidity creation in microfinance include characteristics not normally considered in traditional banking.

In microfinance literature, the ability of MFIs to successfully operate in areas which cannot be reached by the traditional financial market is often ascribed to the unique lending strategies employed by the institutions. Local MFIs often get around the lack of adequate collateral by extending group loans, in which peer pressure and monitoring take the place of collateral, to ensure timely repayment (e.g. Armendáriz and Morduch, 2010).

Based on this assumption, I am interested in examining the correlation between lending strategy and levels of liquidity creation. If microfinance institutions are able to reduce risk through the use of joint lending, this may explain their ability to produce levels of liquidity on par with that of traditional intermediaries, despite the unstable external environments, the absence of comprehensive credit registries and lack of adequate collateral. In addition to this, I wish to examine the general impact of diversification in lending strategies on levels of liquidity, to determine whether the act of specialisation or diversification alone is significantly correlated with LC.

I use panel data from the MIX database, to study the impact of specialisation and the unique lending methodologies employed by MFIs, while controlling for the impact of size, capital, profit-status, regulatory status, age, bank risk and region, as well as macroeconomic indicators, such as GDP and inflation.

I find that a high degree of specialisation has strong, positive correlation with the creation of liquidity in MFIs, and equally observe significant positive relationships between the use of joint lending methodologies and liquidity creation when scaled for size, supporting the suggestion that joint lending strategies mitigate risk, by reducing the impact from asymmetric information.

The study provides a first insight into the drivers of liquidity creation in microfinance, and also contributes to the general understanding of the relationship between diversification and liquidity creation. The results indicate that institutions, which specialise their lending methodologies, are the strongest liquidity creators, possibly because they are better able to navigate a market in which the needs and characteristics of the lender are keys to ensuring successful repayment. Additionally, my findings suggest that high engagement in joint lending practices have a positive effect on the level of liquidity created for the market.

The chapter is structured as follows. Section 5.1 provides a brief discussion of key literature, discussing the impact of lending strategies and diversification in microfinance. The discussion here has primary focus on the findings in empirical literature. However, a more in-depth theoretical discussion on lending strategies and their impact can be found in the presentation of microfinance literature in chapter 3.

Section 5.3 presents the models used to estimate the impact of specialisation and lending strategies on levels of liquidity created in microfinance. Section 5.4 discusses the dataset used, as well as the results of my estimable models. Finally, section 5.5 presents the findings, and discusses their implications for practitioners, policy-makers and researchers.

5.1. Literature

In the following section, I provide a brief overview of key literature related to the joint lending strategies uniquely employed by microfinance institutions, and discuss their potential impact on levels of liquidity created by MFIs. Since chapter 3 already covers the theoretical discussion behind the strategic use, the following focuses primarily on existing empirical literature. In addition to this, I provide an overview of the literature on loan diversification and specialisation in financial intermediaries, and how this may relate to microfinance institutions.

5.1.1. Lending Strategy in Microfinance

As discussed in chapter 3, the use of joint lending strategies in microfinance is a way for intermediaries to reduce risk and overcome agency issues related to asymmetric information.[52] In joint lending, borrowers form a group in which everyone is liable for the timely repayment of the loans taken. In addition, the MFIs use intensive monitoring and comprehensive evaluation schemes, whose cost are kept low through the use of inter-group peer monitoring, mitigating potential moral hazard issues. Finally, the institutions use the promise of access to future lending as a form of additional pressure, to ensure timely repayment, which also helps reduce adverse selection issues (Ghatak, 1999; Morduch, 2000).

According to the theory, microfinance institutions are able to reduce transaction costs, which would otherwise be too high given the small loans extended, through peer pressure and utilisation of social capital. Generally, the theory argues that kinship, knowledge and

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[52] Joint lending refers to two unique types of lending, both of which use joint liability. Group lending is the most used form of joint liability lending. It refers to the use of groups for disbursement of funds and collection of repayment on loans to either the group as a whole or to the individual members of that group. Borrowers of such groups often bear joint liability for the repayment of all loans to the group and its members. This group liability may also determine credit decisions made by the institution. Groups vary in the degrees to which they use groups for credit decisions, disbursement, collection, or to reduce credit risk. Following the MIX definition, loans are here considered to be of the group methodology when some aspect of loan consideration depends on the group, including credit analysis, liability, guarantee, collateral, and loan size and conditions. In contrast, individual lending refers to any loan is extended to an individual, and where the liability is held entirely by the one client. Loans which are given with individual liability, but are disbursed and recollected through groups, are still considered individual lending. (MIX, 2013)

shared locality allows the MFIs to successfully employ credit contracts of a size and nature, which would have been too expensive and too risky for more traditional intermediaries (Armendáriz and Morduch, 2010).

While the promise of future access to loans should work across different lending strategies, the joint lending approach allows for a form of social enforcing, which is near-impossible to implement without the joint-lending structure. Social enforcing fills the gap left for traditional intermediaries, who face severe challenges when trying to enforce financial sanctions against poor clients who default. Because the clients have little to begin with, the available array of traditional sanctions is rarely useable (Ghatak, 1999). In the case of social enforcing, the pressure to repay on time comes from the client's neighbours and group peers, which is both more effective and less costly for the institution than traditional means of enforcement.

Empirical Studies

Empirically, the existing literature largely confirms the theoretical assumptions made above.[53] Work by Wenner, as well as Wydick, show evidence that joint liability lending facilitates better information flows, which in return correlate to better repayment rates (Wenner, 1995; Wydick, 1999). However, the studies have been criticised for not being able to assess the impact of institutional monitoring (Morduch, 2000).

Sharma and Zeller (1997), who studied 128 MFIs in Bangladesh using group lending, found empirical support for the argument above. They showed that if prudent banking practices are present, repayment rates are strong - stronger than those of nationalised commercial banks, especially if members are allowed to pick their own group participants.

However, relationships can also get too close. Same study found that family members had a negative effect on repayment rates, suggesting a weakening of the ability of the group to adequately monitor and enforce repayment due to the complications of close and more complicated social ties (Sharma and Zeller, 1997:1740). The study also found that diversity in asset size and business activity had a positive impact on repayment rates. The finding that

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[53] For a detailed discussion of the mechanisms behind the impact of joint lending, please see chapter 2.

social ties and increased information about group members have a positive impact on repayment rates is also found in studies by Zeller and Sharma (1998), Wydick (2001) and Hermes et al. (2005).

The client-level impact of joint liability lending has been called into question by some research, causing heated exchanges back and forth between groups of academics. This is especially evident in the decade-long exchange between Pitt and Khandker, who observed increased consumption in poor-households obtaining group loans, and Morduch and Roodman, who has argued that the study shows the impact of program selection, rather than that of group lending (Pitt and Khandker, 1998; Morduch, 1999a and 1999b; Khandker, 2005; Roodman and Morduch, 2014; Pitt, 2012).

In addition, some academics argue that most studies looking at the impact of joint lending have ignored the impact of other institutional procedures, such as peer monitoring (de Aghion and Morduch, 2000). While it is true that peer monitoring almost certainly has a positive impact on repayment rates (and with that, levels of liquidity created), I would suggest that one is invariably linked with the other. Individual loans are different in the very fact that they are not naturally subject to the same form of local monitoring. The point, however, is still relevant, since it may help explain the difference in the impact of village and group lending, respectively: Tribal communities are closer and may impose better monitoring than traditional intermediaries.

However, it may not be as intense or as effective as that found within joint liability groups, where the consequences of default have more direct and dire consequences for the monitor as well. Some empirical evidence suggests that the efficiency of group lending relates directly to the strength of the social connections between group members, which may explain why group lending may be seen as more efficient than village banking by some (Karlan, 2007). Newer studies have found clear and consistent impact on income levels and household expenditures from village loan lending initiatives (e.g. Ksoll et al., 2016). These findings are generally supported by previous research, observing positive impacts on short term capital, consumption and household income (Kaboski and Townsend, 2012; Brannen, 2010; Sibomana and Shukla, 2016).

Armendáriz and Gollier (1996), show that MFIs, which use joint lending strategies, are able to reduce the presence of credit rationing and enable conditions for lower interest rates, under conditions with asymmetric information. They argue that this happens because cross-subsidisation amongst borrowers replaces the traditional need for collateral. This 'collateral effect' functions as a risk-pooling function, which allows the microfinance intermediaries to maximise their efficiency, in spite of incomplete information (Armendáriz and Gollier, 1996).

Similar results are found by Besley and Coate (1995), who show that joint lending gives successful group members incentive to help the repayment efforts of less successful members of same group. They argue that the negative effect on successful clients in defaulting groups could be negated by the presence of social collateral, but that this requires that the social sanctions imposed by the group are strong enough. Studies done by Bhole and Ogden (2010) challenge this notion, arguing that even in situations where the presence of social collateral is weak, the use of joint lending can under certain conditions still be preferable to individual lending. They show that the use of a flexible contract can increase borrower welfare compared to individual lending, and crucially, that joint lending is financially viable for a wider range of opportunity cost of capital. The authors suggest that this is due to the conditions of the contract, in which the amount owed for fellow group member is '...optimally determined', and that penalty imposed for default is allowed to vary across group members (Bhole and Ogden, 2010: 349).

Armendáriz and Morduch demonstrate how, when employing a traditional lending contract, a financial intermediary is not able to extend loans at an interest rate which covers its cost, while still keeping it worthwhile for 'safe', risk-averse borrowers (Armendáriz and Morduch, 2010). The lack of collateral among the poorest segment of society, along with market inefficiencies brought about by asymmetric information, would cause challenges for the bank in the form of both moral hazard and adverse selection.[54]

The lack of information available to the intermediary means that it would not be able to prevent its customers from taking undue risk as well as increasing the chance of their

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[54] Moral hazard is an event which incurs when an individual engages in excessively risky behaviour, knowing that they will be covered from the risk and potential cost by a third party. Adverse selection happens when two parties are in possession of imperfect and unequal information (asymmetric information), which leads to decisions made with undesired effects. Please chapter 2 for further detail.

defaulting on the loan. At the same time, asymmetrical information would cause the financial intermediary to treat 'safe' and risky' borrowers the same, charging same interest rates, thus causing the bank to drive away 'safe' borrowers. This would in turn leave the intermediary with the risky borrowers and an increased chance of default (Armendáriz and Morduch, 2010).

Finding similar positive impact from joint lending strategies, Ghatak shows how banks are able to screen clients by 'the company they keep'. He argues that risky borrowers are less likely to accept an increase in the extent of joint liability, compared to risk-averse clients. A bank that offers two contracts, one with high joint liability but low interest, and one with low joint liability and high interest, the risk-adverse clients will choose the high joint liability option, while risky clients will choose the other. Because of this, the author finds higher levels of repayment and efficiency, under conditions of high joint liability, compared to more traditional individual-liability lending contracts (Ghatak, 1999).

However, not all studies of the impact of joint lending strategies are positive. In their 2010 study, Giné et al. find that the joint lending methodology, intended to strengthen the individual client's incentive for repayment, is vulnerable to both collusion and free-riding. They argue that in cases where clients are not part of a homogenous group, the risk taken by the individual member increases due to the presence of adverse selection and moral hazard (Giné et al., 2010).

5.1.2. The Institutional Development of Joint Liability Lending

Joint liability lending is not a new invention. As was seen in chapter 2, versions of the approach have been seen successfully applied to lending as far back as the Irish Loan System in the 1700s, and were widely used by German credit unions in the 1800s as well.[55] In modern microfinance, the most well-known example of joint liability use is that of the Grameen bank in Bangladesh.

In German credit unions, a screening of potential members was typically performed, in which not all members were admitted into the cooperative, and loans could be denied to

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[55] For a more detailed discussion of the historical development of microfinance, please see chapter 2.

members (Ghatak, 1999). Similarly the cooperatives would eject members who broke the rules of the credit union. If a member could not keep up with the repayment schedule, the cooperatives would audit the borrower, and take one of a number of possible actions. Enforcement would sometimes happen through the formal legal system, but more often than not, it relied on social capital, pressure and sanctions to ensure against moral hazard. Often, co-signatures were required as well, to ensure repayment in case of default.

The procedures applied by the Grameen Bank follow similar patterns to that observed in the German credit union sector. However, here some cautionary tales point out that what in praxis happens 'on the ground' is not always in line with the impression held by the Bank's management (Todd, 1996).

This may for example be expressed in disparity between what the stated purpose of a loan is, and how it is actually used. Often, this takes place if the loan taker wishes to use the funds for forbidden or controversial purposes, and the loan taker is unsure if they would receive the Bank's approval (Todd, 1996). The author notes that group members typically are aware of what other members in reality use the funds for, even if the intermediary is not.

Joint liability lending has also been applied to modern, developed markets, though with mixed results. In the US, efforts to implement group lending, similar to that of Grameen bank, faced a number of difficulties. The biggest of these is if members engaging in group loans typically do not know each other beforehand, and because of this, successful groups often take between 6 and 8 months to form, and develop the necessary trust (Balkin, 1993). In the case of Grameen, members are required to meet regularly and participate in activities, which are directly related to the development of trust, solidarity and knowledge within the group (Yunus, 2003).

5.1.3. Group vs. Village Banking[56]

Theoretically, the size of groups in joint liability lending can have two opposing impacts. If we assume that the returns of individual projects are not correlated, then a larger group size should increase the effectiveness of joint liability lending, since it raises the total number of possible outcomes, in which the group as a unit is able to repay its total loans.

However, if we accept that joint liability lending is likely to work due to increased quality of information between group members, we must assume that behaviour, and with it returns, is correlated. The increased quality of information enables the group to impose social sanctions and engage in peer monitoring, but both of these effects are likely to be weakened, if the group becomes too large. In addition, an increase of group sizes also increases the risk of free riders, and with increased complexity in coordination, the advantages outlined above may disappear or be significantly weakened.

Empirically, the optimal group size has typically been found through trial and error. For Grameen, the typical group size is five. For others, they may be much larger, sometimes up to 100 members (Mosley and Dahal, 1985; Owusu and Tetteh, 1982), though the larger groups often face challenges ensuring adequate monitoring and collection. Some empirical literature argues that the use of small groups is essential to the success of joint liability lending (e.g. Devereux and Fishe, 1993).

Armendáriz and Murdoch suggest that group lending methodologies may also have an effect on 'village banking' type loans, where the loan is granted to a larger group of people, who do not usually know the risk-willingness of the other group members. In this scenario, risky borrowers will gain from being matched with safe borrowers, but safe borrowers may gain as well, if the lending structure allows for higher returns for risky borrowers than safe, when they succeed. The village lending contract will in this case draw more from the risky borrowers when they succeed, but not draw as much from the safe borrower when the risky customer fails, due to what Armendáriz and Murdoch defines as 'limited liability', where

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[56] Village banking refers to methodologies that provide access to credit and savings services through group or community managed associations. Loans from MFIs are considered of this type when the MFI lends to the group, which in turn uses this money to lend to its members. Village banking loans are typically made under the collective guarantee of the group. Loans may also be made from the retained profits of the group or from group members' savings. These loans are considered internal to the village community (MIX, 2013).

borrowers cannot repay more than their current income flow. The methodology causes the risky borrower to positively affect the safe borrower, enabling the safe borrower to lend at lower rates. The lower interest rates resolve credit rationing issues, by increasing the number of safe borrowers taking out loans (Armendáriz and Murdoch, 2010).

The empirical evidence here appears to be more ambivalent, particularly due to the observed importance of close social ties. Karlan (2007) studied the presence and role of social ties in relation to group lending methodology, using data on 2000 individual group members. The study finds stronger repayment rates in groups with higher social ties. The author argues that the increased repayment rates are due to higher levels of monitoring and enforcement of punishments tailored to the specific context (Karlan, 2007). In a similar study on social capital, Cassar et al. (2007) used 98 groups with 498 borrowers from two separate geographical locations, and found that social and cultural homogeneity, trust and past positive experiences improve repayment rates. However, superficial knowledge of one another does not, if not accompanied by one of the other indicators (Cassar et al., 2007).

Overall, the reduction of risk through elimination of asymmetric information allows the MFI to extend illiquid loans to borrowers which would otherwise have been too risky for the intermediary. Because of that, the level of liquidity created by the MFI is likely to increase, though no empirical work has yet been done to confirm this assumption, something this thesis seeks to rectify.

5.1.4. Product Diversification and Specialisation

Current literature lists two primary areas where diversification may be of interest to smaller financial intermediaries: the discussion of potential diversification benefits in banking, as well as its impact on small business lending, both of which are potentially relevant for the microfinance industry. Smaller banks are suggested to have an advantage in extending loans to smaller business firms, because they are able to process soft information better and draw on informational advantages compared to larger companies. Some studies observe organizational diseconomies of scale, as well as increased expertise in locally scattered

markets amongst smaller institutions, and with consumers that will often prefer organisations with stronger local ties (see, for example, Stiroh, 2004; Pilloff and Rhoades, 1996; deYoung, 1999; Berger and Humphrey, 1997; and Jensen, 2009).

While looking at the traditional banking sector, DeYoung notes that the share of assets in small business lending is negatively correlated with the size of the banks studied, and Berger et al. suggests that smaller financial intermediaries make use of fundamentally different lending methodologies than larger intermediaries do (DeYoung et al., 1999; Berger et al., 1993). Additionally Pilloff and Rhoades find that larger financial intermediaries do not have net competitive advantages when compared with smaller banks (Pilloff and Rhoades, 2002). All of these findings are in line with what is generally observed within the microfinance sector, where unique lending methodologies are employed to reach customers otherwise left unserved by larger financial intermediaries (see, for example, Armendáriz and Morduch, 2005; Hermes and Lesink, 2007).

With regulation being weak and often poorly implemented in much of the main market for microfinance, it may be assumed that microfinance institutions might take advantage of diversification to reduce risk and increase their revenue stream (Stiroh, 2004; Morgan and Samolyk, 2003). However, the empirical evidence from traditional banking literature of the correlation between bank risk and diversification is not conclusive. Some empirical literature finds a negative relationship between an expansion of business activities and risk reduction, while some observe positive correlations between risk and diversification (DeYoung and Roland, 2001; Templeton and Severiens, 1992).[57] Stiroh finds that diversification for small businesses into new business activities and operations do not create diversification benefits for the small financial intermediaries. Specifically, the study finds negative correlations between risk-adjusted performance and diversification in commercial and industrial lending. Stiroh notes that concentrated loan portfolios are associated with lower risk-adjusted profits, but finds that this only happens if the intermediary expands within already existing

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[57] An area in which literature within traditional banking has found evidence of diversification gains, is the expansion of business revenue streams of banks into non-bank activities such as insurance (see, for example, Saunders and Walter, 1994; Boyd and Runkle, 1993). For the microfinance sector, in which some established institutions are currently expanding into micro-insurance, this is interesting, but not the focus of this particular study.

areas of expertise and methodology (Stiroh, 2004). In a microfinancial context, it thus may be of benefit for the MFI to expand its loan product range within an area and using a methodology that they are already familiar with, but steer clear of expansion into unfamiliar areas and methodologies, in which the wants and needs of the client base is fundamentally different from their previous lending activities.

The use of alternative lending strategies to address the weak information available on borrowers, as well as the lack of adequate collateral as security, are both key traits which set microfinance apart from traditional banking. Far from just being a development tool to address poverty concerns in developing and emerging markets, it is today also finding increased use in more developed environments. Microfinance initiatives are used to reach parts of the population which are considered too risky to be served by more traditional financial intermediaries, and because of this, are left without access to capital.

If we want to understand the potential impact of MFIs as banking institutions, we need to understand what factors carry significant influence on its ability to function as a financial intermediary. We need to look closer at the traits which make MFIs unique, and understand their impact on MFIs' ability to create liquidity for the market.

5.2. Research Question and Hypotheses

This chapter therefore takes a closer look at the impact of lending strategies upon the levels of liquidity created by the MFI. In particular, I am interested in the effect of diversification of lending approaches upon liquidity creation, and especially whether this applies across all lending strategies or for only joint lending methodologies in particular. The results will help shed light on how and to what extent MFIs are able to help funnel liquidity into their surrounding financial markets.

As seen in the previous chapter, MFIs appear to be able to create liquidity on par with traditional intermediaries, despite the increased risk from collateral-less lending, and unstable external environments. Based on this, and the gap in existing literature identified earlier in this chapter, this chapter seeks to answer the following question:

How do microfinance institutions successfully create liquidity for the market, without taking undue risk?

a) What is the impact of specialisation and joint lending strategies on levels of liquidity creation?

b) What are other unique characteristics of MFIs, which may drive liquidity creation in microfinance?

5.2.1. Hypotheses

Based on the existing literature, it is clear that microfinance institutions are able to successfully navigate around the obstacles usually facing financial institutions in developing regions. The MFIs manage to address issues arising from high transaction cost, the threat of adverse selection, moral hazard as well as the cost and time of adequate monitoring and enforcement. The primary tool used to address these, is the use of joint lending strategies to lower both transaction and auditing costs, as well addressing the challenges associated with a weak financial market into strength, by using access to future loans as both carrot and stick (Armendáriz and Morduch, 2010; Ghatak and Guinnane, 1999).

The ability of MFIs to successfully ensure repayment and reduce risk is likely to be directly related to their ability to produce liquidity for the market. However, as we saw in the previous chapter, not all of the traditional impact variables have equally consistent impact in microfinance. While the impact of capital remains significant and negative, size is less consistent across years and measurements, though still with consistent negative correlation to LC. Deposit insurance does not appear to be correlated with levels of liquidity creation, lending credence to Schaefer and Deep's proposal that the impact of liquidity creation is not explained by the threat of bank runs as Diamond and Dybvig proposed, but rather through the level of capital risk (Schaefer and Deep, 2004; Diamond and Dybvig, 1983; Diamond and Rajan, 2001).

Traditional bank risk, here measured as the level of portfolio at risk, is negatively correlated with LC, and largely insignificant, suggesting that the drivers of liquidity creation in microfinance should be found elsewhere. The macro-environment, in particular variables

impacting the regulatory framework, is studied in further detail in chapter 6, while this chapter is particularly interested in institutional characteristics driving liquidity creation.

H1a: Specialised lending is expected to be positively correlated with LC.

While existing literature on specialisation in microfinance is limited, newer research in diversification amongst smaller financial institutions suggest that smaller institutions may not receive the same diversification benefits as larger institutions do, and find this to be true especially for commercial and industrial lending (Stiroh, 2004). For this reason, I expect diversification gains to be either weak or absent for microfinance institutions in general. Specialisation of lending methodologies is therefore likely to be positively correlated with levels of liquidity created by the MFIs.

H1b: Joint lending is expected to be positively correlated with LC.

Based on the theory and empirical findings outlined above, as well as in chapter 2, joint lending appears to have a mitigating impact on risk, as well as a general positive relationship on repayment rates, especially for group loans, where members know each other well, but are not directly related.

The previous chapter showed no significant impact from deposit insurance, and capital risk appeared to be negatively correlated with LC in microfinance. I thus expect joint lending to be positively correlated with levels of LC, due to the risk reducing effect of joint lending strategies proposed in chapter 2 (e.g. Armendáriz and Morduch, 2010; Ghatak, 1999).

H2: other unique characteristics driving liquidity in microfinance are organisational type and the presence regulatory framework. Both are expected to be positively correlated with LC.

Based on the consistent results observed in the previous chapter, I expect the relationship between LC and regulation to be strongly positive. Unless significant diversions from

previous results are observed, it is not something I discuss in detail in this chapter. Instead, I take a much closer look at aspects of the regulatory framework and microfinance in the following chapter.

With regard to organisational type, I expect to see similar positive correlations between NGOs and levels of liquidity creation. The life-cycle theory outlined in chapter 2 states that MFIs often display a tendency to change over time, from NGOs to more commercial institutions as they mature. As smaller institutions and NGOs tend to create more liquidity, the correlation between age and LC should be negative and significant, as should OSS. So far however, neither has displayed convincing levels of significance.

5.3. Methodology

To answer the research question and sub-questions stated above, I have run 3 fixed effects models, in which a number of characteristics unique to microfinance are estimated. Following a similar methodology to the previous chapter, I use panel data from MIX here specifically to estimate the institutional impact of specialisation and lending strategies on levels of liquidity created by MFIs.

While I control for general traits which traditional banking literature suggests are relevant for the creation of liquidity in financial institutions, I am here particularly interested in the MFI characteristics which are unique to the microfinance sector.[58]

One of the key traits setting MFIs apart from other financial institutions, and which literature highlights as a way to mitigate risk in the face of lacking collateral, is the innovative lending strategies employed in MFIs. I am both interested in the impact of diversification in chosen lending strategies, as well as the impact of the individual approach. For this reason, my key independent variables measure the effect of diversification in the MFI loan practices, as well as measuring the specific impact of joint liability, group and individual lending on the creation of liquidity.

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[58] For a more detailed discussion of the impact of traditional bank traits, please see discussion in chapter 4.

5.3.1. Model 1: Diversification and Specialisation in Microfinance

To study the impact of lending strategy on liquidity creation, I first need to know whether the level of diversification of lending activities on its own has an impact on liquidity creation. For this purpose, I measure the degree of specialisation across MFIs, by computing a normalized Herfindahl-Hirschman Index (HHI) of lending methodologies. The HHI Index was traditionally developed to measure the level of market concentration, by taking the square of each market share, and adding the numbers for the final sum. In this study, I adapt the same approach, to calculate the concentration of a particular type of loan (individual, group and village), as a share of the overall loan pool of each MFI.

I thus calculate the following:

Equation 5.1: Loan Type as Share of Total Loans

$$SS_{it} = \left(\frac{IND_{it}}{TLEND_{it}}\right)^2 + \left(\frac{GR_{it}}{TLEND_{it}}\right)^2 + \left(\frac{VB_{it}}{TLEND_{it}}\right)^2$$

Where SS_{it} comprises the sum of the squared lending methodologies for MFI i in year t. IND refers to individual loans, VB is village bank loans, GR is group loans and finally TLEND is total loans. I then find:

Equation 5.2: Herfindahl-Hirschman Index (HHI) for Specialisation

$$HHI_{it} = \frac{SS_{it} - \frac{1}{3}}{1 - \frac{1}{3}}$$

where MFIs that only provide one type of lending will obtain an HHI score of 1, while MFIs which engage equally in all lending strategies will gain scores closer to 0. Higher HHI values will thus indicate the MFI's degree of product specialisation.

Estimations for Specialisation

To investigate the relationship between the degree of specialisation and levels of liquidity created by the MFI, I estimate the following fixed effects model:

Equation 5.3: Liquidity Creation and Specialisation, DV I-III

$$LIQ_{it} = \alpha + \beta_k HHI_{kit-1} + \delta_1 CAPITAL_{it-1} + \delta_2 it - 1 + \delta_3 AGE_{it} + \delta_4 RISK_{it-1} + \delta_5 NGO_{it} +$$
$$\delta_6 OSS_{it-1} + \delta_7 REG_{it} + f_j + T_i + \varepsilon_{it}$$

where HHI_{kit-1} captures the effect of specialisation on levels of liquidity creation in MFI i for period t. As in the previous chapter, LIQ represents one of the following measures of liquidity creation of MFI i in period t: pure, absolute liquidity creation (LC), LC scaled by total assets (LC_GTA), liquidity to equity (LC_E) and liquidity creation to total loans (LC_GLP). In all 3 models, the pure LC values have been deflated using the World Bank Consumer Price Index (CPI).

Table 5.1: Variables and Definitions (Model 1)

Variable	Definition
Liquidity creation (log)	Log of the pure liquidity creation value, deflated using the CPI Index.
LC/GTA	Liquidity creation scaled by size.
LC/E	Liquidity creation scaled by equity.
LC/GLP	Liquidity creation scaled by total loans.
HHI Specialisation	HHI Index indicating level of lending specialization. The higher the value, the higher the level of specialization.
Capital	Measured as the ratio of equity to total assets.
Regulation (dummy)	Dummy indicating whether the individual MFI is regulated.
Size (log)	Measured as a log of the MFI's total assets.
Age	Age of MFI, measured a number of years since year of establishment.
NGO (dummy)	Dummy variable taking the value 1, if the MFI is registered as an NGO.
Bank risk	Bank risk, measured as the ratio of portfolio at risk, 30 days.
Operational self-sufficiency	Ratio of financial revenue divided by financial and operating expense, and impairment loss.

The HHI model includes a set of variables, which estimate the impact of MFI characteristics, as well as control for more general traits.[59] These are the age of the MFI, calculated as year y minus the year of establishment (AGE), as well as the size of the MFI, measured as the one-period-lagged log of total assets (SIZE). I also control for the impact of capital (CAPITAL), measured as the one-period-lagged proportion of equity to assets (Diamond and Rajan, 2001; Berger and Bouwman, 2009; Horvath and Seidler, 2013).

The level of bank risk present in the MFI is measured as the one-period-lagged ratio of portfolio at risk > 30 days to the MFI's gross loan portfolio (RISK). Finally, two dummy variables are included, indicating whether the MFI is employing a non-profit organisation (NGO), and whether the MFI is regulated by a state banking supervisory agency (REGULATION).[60]

Aside from regulation, macro-economic variables are not included in the main regressions presented here. The addition of the variables, while insignificant themselves, reduced the adjusted r-squared from 20.3 to 18.1. The relationship between the remaining variables remains qualitatively the same.

All right-hand side variables in the estimation are lagged one period, to account for potential endogeneity problems and robust standard errors are clustered at MFI level. This is done to address possible serial correlation of residuals between the observations, and the dispersion of coefficient estimates across clusters[61].

As in the previous chapter, I measure liquidity creation using a cross-country approach, but recognise that there is likely to be regional differences in the creation of liquidity. For this reason, I include a fixed effect to capture the unobserved geographical traits over time.

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[59] I do not include deposit insurance or capital requirements in the main regressions for two reasons. First, including them reduces the sample with over 20%. Given the reduced data on loan strategy from our main dataset, the loss of observations has significant impact on reliability. Second, while results remain qualitatively the same, the inclusion of the two significantly reduces the explanatory power (adjusted r-squared) of the model.

[60] Deposit insurance is not included in the results presented here. Including the dummy variable provided by the Barth index is positive but insignificant, and lowers the r-squared value significantly. The relationship between variables remains the same.

[61] In addition to the vif test, correlation matrices were created for all regressions in the dissertation, with upper limits set to 0.4. As can be seen in Appendix E, no correlation among the independent variables breaches this limit.

f_j is therefore a vector of regional dummies, using the six MIX regional category for division: Sub-Saharan Africa (SSA), Middle East and North Africa (MENA), Eastern Europe and Central Asia (EECA), East Asia and Pacific (EAP), South Asia (SA) and Latin America (LAC).

Finally, I include a time trend (T_i) to capture any banking-related methodological changes over the time. ε is a stochastic error term. α is a constant term. β and δ are the unknown coefficients to be estimated. The subscripts *i* and *t* refer to MFI and time, respectively.

5.3.2. Models 1 and 2: Measuring the Impact of Joint Liability Loans

Models 1 and 2 describe two empirical models, used to estimate the relationship between liquidity creation and the lending strategies employed by microfinance institutions.

As above, these models also use panel data to run fixed effects estimations, in which the independent variables have been lagged one-period to minimize endogeneity concerns, and results are clustered at MFI level, to address issues of heteroscedasticity and serial correlation.[63] In addition, with variance inflation factor (vif) values all well below 2 (1.10 to 1.89), there should be no significant concern about multicollinearity[64].

Equation 5.4: Model 1: Liquidity Creation and Lending Methodology (ratio), DV I-III

$LIQ_{it} = \alpha + \beta_k LEND_{kit-1} + \delta_1 CAPITAL_{it-1} + \delta_2 it - 1 + \delta_3 AGE_{it} + \delta_4 RISK_{it-1} + \delta_5 NGO_{it} + \delta_6 OSS_{it-1} + \delta_7 REG_{it} + f_j + T_i + \varepsilon_{it}$ (Model 1)

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[62] I do not include fixed effects at country level here, because I do not have sufficient observations to do so.

[63] The Hausman specification test returned values between 0.000 and 0.034, suggesting best fit with fixed effects. However, estimations using a random effects model with robust standard errors returned similar qualitative results.

[64] In addition to the vif test, correlation matrices were created for all regressions in the dissertation, with upper limits set to 0.4. As can be seen in Appendix E, no correlation among the independent variables breaches this limit.

Equation 5.5: Model 2: Liquidity Creation and Lending Methodology (dummy), DV I-III

$$LIQ_{it} = \alpha + \beta_k LEND_{HIGH_{kit-1}} + \delta_1 CAPITAL_{it-1} + \delta_2 it - 1 + \delta_3 AGE_{it} + \delta_4 RISK_{it-1} +$$
$$\delta_5 NGO_{it} + \delta_6 OSS_{it-1} + \delta_7 REG_{it} + f_j + T_i + \varepsilon_{it} \text{ (Model 2)}$$

In the estimations above, $LEND_{kit-1}$ captures different indicators of lending methodology. In particular, it is the share of lending type k over total lending of MFI i (lagged one-period), where k = joint liability (group + village banking loans), group and individual loans. Because there are not enough village loans to observe reliable results for village loans alone, I only include these as part of the joint liability category.

Since most of the MFIs offer both joint lending and individual loans, it is possible that the negative or insignificant effect of one type of loan may crowd out the positive relationship of another. To address this, I estimate a third model, designed to capture the effect of joint lending in MFIs with high specialisation in either joint, group or individual lending. Model 3 includes a set of dummy variables which identify MFIs with high levels of lending of a particular type (LEND_HIGH). It takes the value of 1, if the share of loans using lending type k by MFI i is higher than the median value of the sample distribution, and 0 otherwise.

As above, I include controls for the age of the MFI, calculated as tear t minus the years of establishment (AGE), as well as the size of the MFI, measured as the one-period-lagged log of total assets (SIZE). Capital is also included, still measured as the one-period-lagged proportion of equity to assets (CAPITAL). Like before, I control for bank risk, still measured as the one-period-lagged ratio of portfolio at risk > 30 days to the MFI's gross loan portfolio (RISK). Finally, the two dummy variables previously found correlated are included, indicating organisational type (NGO), as well as the MFI's regulatory status (REGULATION).[65]

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[65] Deposit insurance is not included in the results presented here. Including the dummy variable provided by the Barth index is positive but insignificant, and lowers the r-squared value significantly, likely to a drop in available data points. Relationships between other variables remain the same.

As before, I use the cross-country approach, but include fixed effects to control for unobserved regional effects over time.[66] f_j is still the vector of regional dummies used, with regional categories following the division used in the MIX database: Sub-Saharan Africa (SSA), Middle East and North Africa (MENA), Eastern Europe and Central Asia (EECA), East Asia and Pacific (EAP), South Asia (SA) and Latin America (LAC).

Finally, I still include a time trend (T_i) to capture any banking-related methodological changes over the time. ε is the stochastic error term. α is the constant term, and β and δ are the unknown coefficients to be estimated. The subscripts i and t refer to MFI and time, respectively.

Table 5.2: Variables and Definitions (Models 2 and 3)

Variable	Definition
Liquidity creation (log)	Log of the pure liquidity creation value, deflated using the CPI Index.
LC/GTA	Liquidity creation scaled by size.
LC/E	Liquidity creation scaled by equity.
LC/GLP	Liquidity creation scaled by total loans.
Lending strategy (ratio)	Ratio of a particular type of lending practice (joint, group, individual) to total loans.
Lending strategy (dummy)	Dummy indicating whether the MFI has a high degree of a particular type of lending. Yes takes value of 1, no 0.
Capital	Measured as the ratio of equity to total assets.
Regulation (dummy)	Dummy indicating whether the individual MFI is regulated.
Size (log)	Measured as a log of the MFI's total assets.
Age	Age of MFI, measured a number of years since year of establishment.[67]
NGO (dummy)	Dummy variable taking the value 1, if the MFI is registered as an NGO.
Bank risk	Bank risk, measured as the ratio of portfolio at risk, 30 days.
Operational self-sufficiency	Ratio of financial revenue divided by financial and operating expense, and impairment loss.

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[66] As before, I do not include fixed effects at country level, because I do not have sufficient observations to do so. For many of the countries I only have one or two observations.

[67] While not included here, I have run estimations including age-squared, to test for a non-linear relationship. The results are qualitatively the same.

5.4. Data

As in the previous chapter, the sample data has been collected from the Microfinance Information eXchange (MIX) database. However, while I still use data from 2004 to 2012, the available amount of observations is significantly smaller, when only MFIs who have specified their lending strategy can be used. Out of the original database, 1163 observations have the necessary values to be used in the estimations on the impact of specialisation, while the total number of available observations for group and joint lending range between 700 and 1200, depending on lending strategy[68].

As before, the original database has gone through extensive cleaning. Duplicates, 'false' zeros and any cases where the balance sheet values do not add up correctly have been removed.[69] In addition, all time-variant values have been winsorized at 1 and 99%, to address potential outliers.

As in the previous chapter, I do not limit MFIs based on size, but instead increase the validity of the data by only using data from MFIs with a diamond rating above 3.[70] The drop in available observations for lending strategy makes it legitimate to consider whether increasing the range of diamond ratings to increase observation count is a valid scientific approach. However, due to the large amount of data errors and unbalanced data, I have decided to still only use ratings above 3. The trade-off in the reliability of my findings is not worth the increase in data points.

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[68] All data treatment and regression work has been done using Stata, version 11 and 15.

[69] This refers, for example, to cases where 0 is not a true 0, but has been set in a category not used, instead of left blank. It also includes cases where sub- and super categories do not add up.

[70] The diamond rating reflects the quality of data received, as well as its degree of audit and documentation. Diamond rating 3 denotes documented financial data, while 4 and 5 are fully audited.

Table 5.3: MFI Summary Statistics, for Measures of LC

2004 - 2012	Number of Observations	Mean	Standard Deviation	Minimum	5th Percentile	Median	95th Percentile	Maximum
Dependent Variables								
Liquidity Creation (Deflated)	3518	13.25 M	280.1 M	0.00 M	0.00 M	2.25 M	73.68 M	157.95 M
Liquidity Creation / Gross Total Assets	3672	0.33	0.16	0.02	0.07	0.33	0.61	0.75
Liquidity Creation / Gross Loan Portfolio	3672	0.47	0.26	0.02	0.10	0.44	0.94	1.45
Liquidity Creation / Equity	3672	2.09	1.71	0.03	0.16	1.66	5.85	8.39
Key Independent Variables								
Lending Model 1 Specialisation (HHI)	1822	0.83	0.26	0.02	0.26	1.00	1.00	1.00
Lending Model 2 Individual	1035	0.72	0.36	0.00	0.03	0.93	1.00	1.00
Lending Model 2 Group	627	0.52	0.40	0.00	0.00	0.50	1.00	1.00
Lending Model 2 Village	170	0.46	0.38	0.00	0.01	0.46	1.00	1.00
Lending Model 2 Joint	703	0.58	0.40	0.00	0.01	0.68	1.00	1.00
Lending Model 3 Individual (Dummy)	1568	0.48	0.50	0.00	0.00	0.0D	1.00	1.00
Lending Model 3 Group (Dummy)	940	0.48	0.50	0.00	0.00	0.00	1.00	1.00
Lending Model 3 Village (Dummy)	257	0.44	0.50	0.00	0.00	0.00	1.00	1.00
Lending Model 3 Joint (Dummy)	1058	0.47	0.50	0.00	0.00	0.00	1.00	1.00
Control Variables								
Capital	3672	0.25	0.17	0.02	0.08	0.19	0.61	0.97
Size	3672	15.96	1.90	7.17	12.96	15.87	19.25	19.97
Age	3671	5.83	3.05	1.00	2.00	6.00	11.00'	14.00
PAR30	3194	0.07	0.10	0.00	0.00	0.04	0.23	1.00
Regulated	3672	0.74	0.44	0.00	0.00	1.00	1.00	1.00
Profit Status	3672	0.44	0.50	0.00	0.00	0.00	1.00	1.00

Because the liquidity creation specifically happens through the transformation of liquid liabilities to illiquid assets, the sample is still limited to deposit-taking institutions. In addition, I eliminate any microfinance institution with negative equity, on the basis that a near-insolvent institution is likely to focus on securing short-term capital, and is likely to change its behaviour and investment strategies accordingly.

As was mentioned in the previous chapter, the data provided to the MIX database, is largely submitted on a voluntary basis, from the microfinance providers themselves. This remains a serious concern and limitation to the reliability of the findings presented here. However, while data in microfinance is slowly getting better as the industry matures, there is still a long way to go, before the quality of data available for research, is on par with more traditional financial markets.

Given the development context and uneven quality of regulatory frameworks, it is not surprising that the data used to evaluate microfinance is less robust than what is found for more developed financial markets. However, a continuous increase in understanding and research is necessary to formulate and implement the best possible policies and regulatory guidelines, to ensure the continued growth of the sector. While the data used here is far from perfect, it is nonetheless better than nothing, and continues to improve with every

year. The introduction of common reporting and increased auditing of data by MIX has certainly helped, and will continue to increase the reliability of the dataset over time.[71]

5.5. Results

Overall, the estimation results show similar and consistent positive correlation between liquidity creation and both the HHI index for specialisation as well as the use of joint lending strategies in microfinance. The sections below discuss each of the estimations in detail.

5.5.1. The Impact of Specialisation

The results of my main regressions indicate that microfinance institutions which specialise their lending practices appear to create more liquidity for the market, than those who diversify their loan strategies (table 4.13). The estimations show very strong and positive correlation between my HHI Index for lending methodologies (in which higher values indicate a higher degree of specialisation) and liquidity creation, across all four measurements of LC used (table 4.8). Using fixed effects models clustered at MFI level, the results are statistically significant at 1%, when controlling for levels of capital, size, age, levels of bank risk and regulation, whether the MFI is an NGO, as well fixed effects accounting for regional differences. This is true both before and after the results were lagged to account for endogeneity.

The results suggest, perhaps due to the high level of complexity in successfully extending collateral-free loans, that specialisation allows the institution to extend larger amounts of illiquid loans, thus creating more liquidity for the market. It is possible that the intricacy of developing adequate monitoring and evaluation systems for a particular type of loan requires more resources than a diversified MFI might be able to cover. By doing this, the MFI becomes better suited to minimise the potential barrier to lending presented by asymmetric information concerns.

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[71] The audit rules used by MIX include factors such as checking the balance of financial statements, and whether ratios are particularly high or low compared to its competitors.

Table 5.4: The Impact of Lending Specialisation on Liquidity Creation

	LC(log)	LC/GTA	LC/E	LC/GLP
Lending Specialisation HHI	0.302***	0.059***	0.506***	0.070***
	(0.09)	(0.02)	(0.16)	(0.03)
Capital	-1.306***	-0.348***	-5.786***	-0.452***
	(0.18)	(0.03)	(0.35)	(0.04)
Size (log)	0.959***	-0.008**	-0.018	-0.002
	(0.01)	(0.00)	(0.04)	(0.01)
Age	-0.004**	-0.000	-0.011**	-0.001
	(0.00)	(0.00)	(0.00)	(0.00)
OSS	-0.086	-0.035	-0.359**	-0.084**
	(0.08)	(0.02)	(0.17)	(0.04)
Bank risk	-1.007**	-0.111*	-0.249	-0.116
	(0.29)	(0.06)	(0.47)	(0.07)
NGO (dummy)	-0.011	0.025**	0.537***	0.009*
	(0.06)	(0.01)	(0.14)	(0.02)
Regulation (dummy)	0.155***	0.028**	0.478***	0.014*
	(0.06)	(0.01)	(0.13)	(0.02)
Constant	0.429	0.554***	4.492***	0.614***
	(0.34)	(0.08)	(0.84)	(0.10)
R2	0.88	0.22	0.43	0.21
R2 Adjusted	0.88	0.20	0.42	0.20
Probability F > 0	0.00	0.00	0.00	0.00
Root MSE	0.63	0.14	1.25	0.20
dfres	527	527	527	527
BIC	2315.4	-1248.6	3915.9	-383.9
Number of observations	1163	1163	1163	1163

Stars indicate statistical significance at 10, 5 and 1%, respectively. Country-level fixed effects estimations with clustering at firm level. Robust standard errors are reported in brackets. LC is pure values of liquidity creation, deflated using the Consumer Price Index (CPI). LC/GTA is LC scaled by total assets. LC/E is LC divided by equity. LC/GLP is LC divided by gross loan portfolio. HHI is a Herfindahl-Hirschman Index, indicating level of lending specialization. Capital is measured as equity ratio, size and age are logs of assets and years since establishment, bank risk the portfolio at risk for 30 days (PAR30). Regulation and NGO and deposit insurance are dummies, indicating whether the MFI is formally regulated, and is for-profit. Operational self-sufficiency (OSS) is the ratio of financial revenue divided by financial and operating expense, and impairment loss.

The results follow a similar trend to those observed in smaller traditional banks, where risk-adjusted performance and diversification appear to be negatively correlated (e.g. DeYoung and Roland, 2001; Stiroh, 2004).

In a similar fashion, the smaller microfinancial intermediaries may better develop the expertise, methodological savvy and local understanding, which is required to successfully extend microfinancial loans, especially in rural markets, where larger institutions are typically too remote to understand the complex nuances in the client profiles. This argument becomes especially convincing, when backed by findings which suggest that an especially high level of joint lending is strongly and positively correlated with the level of liquidity creation in microfinance institutions (tables 4.14 and 4.15).

I find that, when controlling for size, age and location, a high level of specialisation in the lending methodologies employed has a positive impact on the amount of liquidity created. This could be due to the level of complexity in microfinance lending, involving high levels of monitoring and evaluation, and that success in reaching as large a client base as possible without taking undue risk, requires a specialised knowledge that an institution offering too many lending constellations may have a harder time developing.

The suggestion that more specialised institutions create more liquidity for the market has a number of potential implications on broader economic policy, as well as MFI strategy. If the mission statement of the MFI is concerned with contributing to the financial health of the region, my findings suggest that the MFI should concentrate on one loan strategy, as opposed to attempting to follow the client for a longer period of time. This may be in conflict with strategies of some commercial microfinance institutions, which otherwise have less incentive to let go of clients that, once they reach a certain size, technically no longer need microfinance assistance.

From a public policy standpoint, two important findings emerge from my results. First, while microfinance institutions appear to create liquidity for the market along the same lines as traditional intermediaries, the amount is impacted by the level of specialisation evident in the MFI, when controlling for region, age, size, organisational structure and regulatory framework.

This suggests that strategies encouraging larger financial intermediaries to 'dabble' in microfinance on the side, for social as much as financial reasons, may not be the best strategy from a macroeconomic policy standpoint, unless the primary goal is social rather than financial.

It should be noted, that less liquidity creation does not necessarily mean that the microfinance initiatives are unsuccessful in reaching their social goals. Rather, the measurement of liquidity creation serves as an indicator of the extent to which the MFIs perform as traditional financial intermediaries, and to what extent they help transform liquidity and funnel it to the market, thus having a possible impact on the general financial climate in their immediate region that goes beyond the individual lenders.

It is possible that the benefits of diversification are more closely related to the range of loan products offered, than to the strategy employed to ensure repayment. The strong correlation between levels of liquidity creation and specialisation in methodological approach does not exclude the possibility that MFIs may successfully gain diversification benefits by expanding the range of loan products made available to their clients. Indeed, the findings in previous literature would suggest that this may well be the case (e.g. Stiroh, 2004).

However, what the results do suggest is that the financial intermediaries seeking to add microfinance to their lending practices as a way to either appease donor or state-level policy requirements may well find themselves performing worse than their competitors. Overcoming the asymmetrical information constraints so strongly present in microfinance is likely to require a higher degree of specialisation and local understanding than a financial intermediary primarily concerned with traditional individual loans may be able to devote to the sector.

5.5.2. Model 1: Impact of Lending Methodologies on LC (Ratio)

As was discussed earlier in the chapter, some research suggests that microfinance should not be able to function according to traditional economic wisdom, due to its high transaction cost and risk associated with collateral-free lending (e.g. De Aghion and Morduch, 2005; Conning and Morduch, 2011). The authors propose that the reason it does so anyhow, is due to its ability to address the problems arising from asymmetrical information, thus lowering the cost and risk associated with microfinancial activity.

MFIs address issues of adverse selection and asymmetrical information by using innovative lending strategies, in which a group or a community is mutually liable for the loans of other members in the group. The strategy enables the MFI to gain access to more detailed information on the lending behaviour of group members, and pushes a large chunk of the time and cost associated with the monitoring of repayments, onto the group or community itself, since it is in their own interest to ensure prompt and adequate repayment from everyone.

In model 1, I estimate a simple ratio of the particular lending strategy to the total loan portfolio (table 4.14). The results are positive and strongly significant for all 4 measurements of liquidity creation, with regard to both total joint lending and group lending alone. Individual lending, however, is either insignificant or negative.

These results support the theoretical suggestion that lending strategy helps increase liquidity creation for the market, by mitigating risk and reducing auditing and transaction cost for the intermediary. Also, in support of this, the insignificant and negative results for individual lending suggests that this strategy does not have the same effect, due to the lack of peer monitoring and social capital.[72]

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[72] I do not include a variable for village baking on its own, because the dataset does not provide enough observations to estimate any reliable results. The regressions run return positive but insignificant results, with low adjusted r-squared (below 0.10), and no values for P > F.

Table 5.5: The Impact of Lending Strategy on Liquidity Creation

	LC (log)			LC/GTA			LC/E			LC/GPL		
	Model A	Model B	Model C	Model A	Model B	Model C	Model A	Model B	Model C	Model A	Model B	Model C
Lending strategy:												
Joint lending (ratio)	0.204**			0.054***			0.244*			0.108***		
	-0.08			-0.02			-0.1			-0.03		
Group lending (ratio)		0.244***			0.061***			0.363**			0.131***	
		-0.08			-0.02			-0.17			-0.04	
Individual lending (ratio)			0.05			-0.008			-0.12			-0.039*
			-0.07			-0.02			-0.14			-0.02
Capital	-1.235***	-1.318***	-1.527***	-0.337***	-0.371***	-0.370***	-4.920***	-4.887***	-5.572***	-0.458***	-0.485***	-0.495***
	-0.2	-0.21	-0.21	-0.04	-0.04	-0.04	-0.43	-0.44	-0.42	-0.06	-0.06	-0.05
Size (log)	0.934***	0.941***	0.969***	-0.013***	-0.017***	-0.005	-0.061*	-0.051*	0.029	-0.001	0.006	0.002
	-0.02	-0.02	-0.02	0.00	-0.01	0.00	-0.05	-0.04	-0.03	-0.01	-0.01	-0.01
Age	0.003	0.003	0.006***	0.001*	0.002**	-0.001	0.008	0.011	-0.014**	0.002	0.002	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00
Bank risk	-0.874**	-0.942**	-1.231***	0.024	0.045	-0.092	0.321	0.741	-0.05	0.393*	0.460*	0.001
	-0.42	-0.44	-0.37	-0.07	-0.07	-0.06	-0.61	-0.65	-0.43	-0.22	-0.24	-0.1
OSS	-0.015	-0.012	-0.038	-0.011	0.006	-0.025*	-0.133	-0.039	-0.304*	-0.054	-0.033	-0.071*
	-0.07	-0.05	-0.07	-0.02	-0.01	-0.01	-0.1	-0.1	-0.16	-0.04	-0.03	-0.03
NGO	-0.072	-0.067	-0.082	0.016*	0.014*	0.012	0.344**	0.323**	0.402***	0.035*	0.037*	0.032*
	-0.07	-0.07	-0.08	-0.02	-0.02	-0.02	-0.15	-0.16	-0.15	-0.02	-0.02	-0.02
Regulation	0.227***	0.212***	0.074	0.051***	0.054***	0.020*	0.467***	0.598***	0.378***	0.057**	0.067***	0.019
	-0.07	-0.08	-0.06	-0.02	-0.02	-0.01	-0.17	-0.15	-0.12	-0.02	-0.02	-0.01
Constant	0.289	0.277	0.294	0.521***	0.485***	0.448***	4.329***	3.877***	3.263***	0.406***	0.338**	0.471***
	-0.38	-0.38	-0.28	-0.09	-0.09	-0.1	-0.98	-1.03	-0.8	-0.1	-0.14	-0.13
R2	0.86	0.87	0.88	0.22	0.28	0.22	0.44	0.46	0.39	0.23	0.28	0.24
R2 Adjusted	0.86	0.86	0.88	0.2	0.26	0.21	0.42	0.44	0.38	0.21	0.25	0.22
Probability F > 0	0	0	0	0	0	0	0	0	0	0	0	0
Root MSE	0.62	0.62	0.64	0.13	0.12	0.12	1.19	1.15	1.18	0.22	0.21	0.19
dfres	361	331	511	361	331	511	361	331	511	361	331	511
BIC	1599.6	1405.9	2422.4	-865.3	-867.1	-1489.5	2633.9	2283.8	3876	-92.6	-111.5	-503.5
Number of observations	797	705	1195	797	705	1195	797	705	1195	797	705	1195

Stars *, **, and ***indicate statistical significance at 10, 5 and 1%, respectively. Country-level fixed effects estimations with clustering at firm level. Robust standard errors are reported in brackets. LC is pure values of liquidity creation, deflated using the Consumer Price Index (CPI). LC/GTA is LC scaled by total assets. LC/E is LC divided by equity. LC/GPL is LC divided by gross loan portfolio. Joint, Group and Individual lending (ratio) are the ratios of that particular type of lending practice (joint, group, individual) to total loans. Capital is measured as equity ratio, size and age are logs of assets and years since establishment, bank risk the portfolio at risk for 30 days (PAR30). Regulation and NGO are dummies, indicating whether the MFI is formally regulated and is for-profit. Operational self-sufficiency (OSS) is the ratio of financial revenue divided by financial and operating expense, and impairment loss.

The results of model 1 present a positive relationship between scaled levels of liquidity created for the market, and the use of joint lending practices. This is especially true for the group loan methodology, where my estimations are significant at the 1 or 5% for all 4 measurements of LC. Group loans are believed to help increase repayment rates and address adverse selection issues, by allowing the MFI access to reliable information on the risk-willingness of the group members. Because the members are reliant on the timely repayment of the other group members, it is in their own interest to screen, monitor and enforce the deadlines set forth by the MFI, lest they risk being subject to sanctions themselves, and be barred from future loans (Morduch, 1998; The World Bank, 2006).

Unlike the group loan estimations, the results for joint lending, while positive and significant, are less consistent. Although this may be due to the noise described above, it is likely be increased insignificance from village loans, which are included in the variable for joint lending. Due to the low amount of available observations for village loans however, I am unable to confirm this with village-only estimations.

Theoretically, while some literature suggests that village banking could help reduce agency issues and solve asymmetrical information constraints; other authors differ, and find results supporting the tentative results above. De Aghion and Morduch (2005), for example, argue that village banking should act like other forms of joint lending, due to its ability to reduce credit rationing issues, but the empirical evidence suggests that it may not be that straightforward.[73] In their 2007 study, Cassar et al. found that superficial social information was not enough to increase repayment rates amongst group lenders (Cassar et al., 2007).

In the case of village banking, it is possible that the social ties present in the community are not always strong enough to increase repayment rates, and with it, lower the risk for the MFI. If the screening and monitoring abilities of the community are not strong enough, the cost associated with the village loans may not always be enough to cause a significant increase in the amount of liquidity created for the market, by the MFIs. This may be because users of village banking feel less directly responsible to each other than a group lending set-up.

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[73] See section 4.2 on salient literature for further details.

5.5.3. Model 2: Impact of Lending Methodologies on LC (Dummies)

In model 1, I investigate the impact of lending strategies, by defining 3 separate dummies for MFIs which hold a high level of individual, group and joint liability loans (table 4.15). As with model 1, I find very strong and consistently positive correlations between levels of liquidity creation and MFIs specialised in joint lending and group loans, while controlling for size, age, capital, bank risk, profit-status and regulation, and regional differences constant over time. The results here are significant at 1% for all scaled values of LC. Individual loans are consistently insignificant and at times negative, except for pure, deflated LC values. This is unsurprising, as individual loans are much more prevalent with larger MFI institutions, while joint lending practices are more often found in small and medium MFIs.

My results confirm the findings of previous empirical work, which found better repayment rates for MFIs using group lending methodologies.[74] The reduction of asymmetrical information and risk of adverse selection, through increased access to reliable information on the risk profile of the individual group members, helps decrease the risk associated with collateral-free microloans. Additionally, the delegation of some of the screening and monitoring activities needed to ensure timely repayment reduces the cost for the MFI. The decreased risk means that the MFI is able to facilitate illiquid loans to its clients, which would previously have been too risky and too costly for the institution.

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[74] See, for example, Sharma and Zeller, 1997; Wydick, 2001 and Hermes et. al, 2005.

Table 5.6: The Impact of Lending Technology on Liquidity Creation

	LC (log)			LC/GTA			LC/E			LC/GPL		
	Model A	Model B	Model C	Model A	Model B	Model C	Model A	Model B	Model C	Model A	Model B	Model C
Lending technology												
Joint lending (dummy)	0.200***			0.038***			0.145**			0.064***		
	-0.06			-0.01			-0.04			-0.02		
Group lending (dummy)		0.191***			0.037***			0.149*			0.081***	
		-0.07			-0.01			-0.07			-0.03	
Individual lending (dummy)			0.094			0.013			0.148			-0.002
			-0.06			-0.01			-0.09			-0.02
Control Variables												
Capital	-1.246***	-1.320***	-1.466***	-0.325***	-0.336***	-0.358***	-4.915***	-4.482***	-5.423***	-0.455***	-0.484***	-0.480***
	-0.19	-0.21	-0.21	-0.04	-0.04	-0.04	-0.43	-0.45	-0.42	-0.06	-0.06	-0.05
Size (log)	0.933***	0.937***	0.973***	-0.016***	-0.015***	-0.004	-0.065	-0.061	0.038	-0.001	0.003	0.003
	-0.02	-0.02	-0.02	0	0	0	-0.05	-0.05	-0.03	-0.01	-0.01	-0.01
Age	0.003	0.004	-0.006***	0.001*	0.002**	-0.001	0.008	0.011	-0.014***	0.001	0.002	0
	0	0	0	0	0	0	0	-0.01	0	0	0	0
Bank risk	-0.857**	-0.986**	-1.257**	0.021	0.032	-0.098	0.294	0.659	-0.128	0.381*	0.433*	0.009
	-0.4	-0.44	-0.37	-0.07	-0.07	-0.06	-0.62	-0.66	-0.45	-0.22	-0.24	-0.1
OSS	-0.012	-0.011	-0.038	0.011	0.06	-0.025*	-0.133	-0.043	-0.308*	-0.054	-0.035	-0.072*
	-0.07	-0.05	-0.07	-0.02	-0.01	-0.01	-0.1	-0.1	-0.16	-0.04	-0.03	-0.03
NGO (dummy)	0.071	0.075	-0.081	0.018*	0.013*	0.012	0.350**	0.33	0.405***	0.001	0.003	0.035
	-0.07	-0.07	-0.07	-0.02	-0.01	-0.01	-0.15	-0.16	-0.15	-0.02	-0.02	-0.02
Regulation (dummy)	0.238***	0.211***	0.071	0.051***	0.051***	0.019	0.459***	0.571***	0.359***	0.053**	0.061**	0.015
	-0.07	-0.08	-0.06	-0.02	-0.02	-0.01	-0.17	-0.15	-0.12	-0.02	-0.02	-0.02
Constant	0.263	0.357	0.169	0.540***	0.519***	0.421***	4.461***	4.133***	2.924***	0.465***	0.410***	0.430***
	-0.39	-0.39	-0.28	-0.09	-0.09	-0.1	-0.98	-1.02	-0.84	-0.14	-0.15	-0.13
R2	0.86	0.87	0.88	0.22	0.27	0.22	0.44	0.46	0.39	0.23	0.27	0.23
R2 Adjusted	0.86	0.86	0.88	0.2	0.25	0.21	0.42	0.44	0.38	0.21	0.24	0.22
Probability F > 0	0	0	0	0	0	0	0	0	0	0	0	0
Root MSE	0.62	0.62	0.64	0.13	0.12	0.12	1.19	1.15	1.17	0.22	0.21	0.19
dfres	361	331	511	361	331	511	361	331	511	361	331	511
BIC	1594.1	1406.1	2416.8	-863.1	-860	-1491.8	3625.2	2288	3873.2	2635.2	-100.7	-497.8
Number of observations	797	705	1195	797	705	1195	797	705	1195	797	705	1195

Stars *, ** and *** indicate statistical significance at 10, 5 and 1%, respectively. Country-level fixed effects estimations with clustering at firm level. Robust standard errors are reported in brackets. LC is pure values of liquidity creation, deflated using the Consumer Price Index (CPI). LC/GTA is LC scaled by total assets. LC/E is LC divided by equity. LC/GPL is LC divided by gross loan portfolio. Joint, Group and Individual lending (ratio) are dummies of that particular type of lending practice (joint, group, individual). Capital is measured as equity ratio, size and age are logs of assets and years since establishment, bank risk the portfolio at risk for 30 days (PAR30). Regulation and NGO are dummies, indicating whether the MFI is formally regulatedand is for.. Operational self-sufficiency (OSS) is the ratio of financial revenue divided by financial and operating expense, and impairment loss.

I propose that group loans can help increase the amount of liquidity created for the market, by addressing the increased costs and risks arising from a lack of strong financial systems, absence of adequate credit registries, as well as the lack of the traditional protection given by collateral in regular banks (Stiglitz and Weiss, 1981). The unique lending methodologies employed by microfinance institutions thus enable the MFIs to not just function as a social tool for poverty reduction in development regions, but perform a key financial function in areas and for clients usually unreachable by traditional financial intermediaries.

The types of services required by individual clients and groups differ in significant ways, one of the more prevalent being the type and intensity of monitoring and evaluation required by the MFI. In the case of joint lending, the microfinance institution is able to save costs on the intensive monitoring of the individual client, but due to the higher levels of poverty amongst its clients, may face higher costs for the training of both staff and clientele. My findings also suggest that it may be problematic if an MFI refuses let go of a profitable client, once they have grown too a certain size, if the institution primarily handles group and village loans. If the potential strain on limited capital that would come from trying to sustain a client grown too large is ignored, the set of requirements needed to service individual customers could hurt the MFI in the long run.

The results of both model 1 and 2 support the suggestion by Morduch and others, that joint lending methodologies help the MFIs to successfully extend microloans to the previously unbanked. It increases the amount of liquidity created for the market, by addressing issues related to asymmetrical information and high transaction costs (De Aghion and Morduch, 2005). A reduction of asymmetrical information issues within the MFIs enables the bank to extend additional loans to client previously considered too risky, thus raising the levels of liquidity created (Nghiem, 2007). Equally, my findings are in line with research by Ngo (2012), which suggests that the use of joint lending practices have a significant impact on lending cost, capital held by the MFI and amount of loans extended.

5.6. Conclusions

Summing up my main findings, the main results suggest that, when controlling for size, age and location, a high level of specialisation in the lending methodologies employed, has a positive impact on the amount of liquidity created. This could be due to the level of complexity in microfinance lending, involving high levels of monitoring and evaluation, and that success in reaching as large a client base as possible without taking undue risk, requires a specialised knowledge that an institution offering too many lending constellations may have a harder time developing.

The suggestion that more specialised institutions create more liquidity for the market has a number of potential implications on broader economic policy, as well as MFI strategy. If the mission statement of the MFI is concerned with contributing to the financial health of the region, my findings suggest that the MFI should concentrate on one loan strategy, as opposed to attempting to follow the client for a longer period of time. This may be in conflict with strategies of some commercial microfinance institutions, which otherwise have less incentive to let go of clients that, once they reach a certain size, technically no longer need microfinance assistance.

From a public policy standpoint, two important findings emerge from my results. First, while microfinance institutions appear to create liquidity for the market along the same lines as traditional intermediaries, the amount is impacted by the level of specialisation evident in the MFI, when controlling for region, age, size, for-profit strategy and regulatory context. This suggests that strategies encouraging larger financial intermediaries to 'dabble' in microfinance on the side, for social as much as financial reasons, may not be the best strategy from a macroeconomic policy standpoint, unless the primary goal is social rather than financial.

It should be noted, that less liquidity creation does not necessarily mean that the microfinance initiatives are unsuccessful in reaching their social goals. Rather, the measurement of liquidity creation serves as an indicator of the extent to which the MFIs perform as traditional financial intermediaries, and to what extent they help transform

liquidity and funnel it to the market, thus having a possible impact on the general financial climate in their immediate region that goes beyond the individual lenders.

5.6.1. The impact of Lending Methodology on LC

My estimations show a significant and positive relationship between joint lending methodologies and levels of liquidity created by the MFIs. The results support the theoretical suggestion that microfinance manages to operate successfully despite lack of collateral and in spite of high transaction costs, by the diminishing of asymmetrical information as a direct effect of group lending in particular, and joint liability lending in general. The risk of adverse selection is significantly reduced, at least for group constellations in which members of the group share/have access to reliable information on the risk profiles of their fellow group members. Because it is in their own immediate interest to ensure timely repayment, the cost of screening and monitoring for the MFI is drastically reduced, as is the level of risk involved in the loan process. With the diminished risk, comes the ability of the MFI to extend illiquid loans to customers, who would have been deemed too risky and too costly by traditional financial intermediaries, resulting in increased levels of liquidity being created for the market.

There are a number of policy implications following this finding. First and foremost is the fact that from a market perspective, the true strength of microfinance is found in the smaller joint lending schemes, and not necessarily larger individual customers.

Second, because joint liability lending is often a specialty trait of smaller MFIs, it may also be important to take a second look at the type of institutions, both in terms of size and type. Both type and size are primary characteristics regularly considered by policymakers, when trying to decipher how financial organisations may provide positive impact upon the meso- and macro environment, to encourage growth in the sector.

Finally, due to correlation between liquidity creation and specialisation in MFIs, the push for ever-larger and more formalised microfinance actors may not be the way to go. Larger financial institutions will not necessarily have the specialised knowledge of local clientele and best lending approaches in a specific context, and therefore not be able to address the

issues arising from asymmetric information and adverse selection the way smaller and more localised institutions can.[75] Given the finite amount of capital available for investment in MFIs and MFI activities, increased investment in specialised MFIs, local and non-profit, may prove to have a bigger impact on the financial level of liquidity created for the market, than trying to persuade more traditional intermediaries to move into the sector.

The push toward commercialization in general in microfinance is also somewhat concerning, given the results found here. Recent studies have found that the continued commercialization of the microfinance sector has caused a marked decline in joint lending methodologies being employed by MFIs (de Quidt et al., 2016). Given their consistent and highly significant impact on levels liquidity creation, the move beyond non-profit microfinance may have severe and unintended impact, on both social welfare and the ability of MFIs to function as liquidity creators for their market.

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[75] An example of this is the Danish aid agency DANIDA's push for CRDB, a near-insolvent Tanzanian bank, to engage in microfinance in 2009, in the exchange for much needed capital. The bank became a first-mover in a young microfinance market, its sheer size and blanket guarantee from DANIDA causing a significant competitive distortion of the market (Jensen, 2009)

6. Regulation, Liquidity Creation and Capital Stringency in Microfinance

The financial sector is a dynamic entity, which evolves and is reshaped as the requirements and degree of intervention from the external environment changes. Especially after the bank crisis of 2008, attention has returned to the discussion of how to ensure a prudent regulatory framework within which an efficient financial sector can work (e.g. Barth et al., 2007; Cull et al., 2009; Hartarska and Nadolnyak, 2007; Berger et al., 2011). The debate, in academic, practitioner and policymaker circles, ranges from the scale and scope of regulatory supervision, to the structure, cost and degree of independence afforded to the individual actor.

The debate is no less important in the study of developing and emerging markets, where the macro-environment is often unstable and societies frequently have less power to ensure healthy behaviour from the financial institutions operating within their region. The debate, both in development and traditional banking literature, is often sensitive to the underlying political discourse, as the degree of state intervention in economic activity is one of the pillars of most political ideology. For this reason, it is little wonder that regulatory findings and recommendations are rarely cohesive or conclusive.

As discussed in detail in chapter 2, the evidence of regulatory impact in microfinance is furthermore not clear. Some findings suggest that a stronger regulatory framework helps reduce risk, thus increasing the performance of the actors affected (Ly, 2013). Others find that regulation curtails the efforts of institutions and is often poorly or inefficiently applied, ultimately having negative impact on the ability of institutions to operate efficiently (Hartarska and Mersland, 2012). Still others argue that it depends on the type of organisation: deposit-taking institutions should be subject to regulatory guidelines and intervention, while institutions which rely strictly on donations and income from interest, should not (Chaves and Gonzalez-Vega, 1994). Regardless of the political disagreements on best practice, the issue and the debate are important. Policies that fail to provide a functioning and enabling environment for the financial sector may undermine activities within the sector or allow financial crises to develop, which could have been prevented with prudent regulatory systems in place.

While the body of existing literature has looked at the relationship between regulation and traditional financial performance, the impact of regulation and supervision on the ability of microfinance institutions to create liquidity for the financial markets in developing regions has yet to be studied. The context is particularly interesting, given that some studies suggest that MFIs still operate outside the traditional financial markets in their respective countries, and as such may be less vulnerable to financial shock (Gonzalez-Vega, 1995; Gonzalez, 2011; Chapra, 2009 and 2010; Krauss and Walter, 2009). However, at the same time, the current heated debate on the identity and future of microfinance suggests increased pressure on MFIs to adapt and merge with the traditional financial sector, thus becoming subject to the same regulatory framework.

If regulation curtails the ability of MFIs to produce liquidity for the poorest in the market, it would be prudent for policymakers to treat the microfinance sector separately from the traditional financial market. However, if regulation helps reduce risk for MFIs and guide their growth and economic development in a way that is healthy for both institution and the macro-environment, the policymakers should take this into account, especially if MFIs appear to be less vulnerable to financial shock than larger, more traditional intermediaries. If they are consistently less affected, their presence could help extend some of the capital withheld by traditional banks, in a time of crisis. In either scenario, it is important to gain further insight into the relationship between regulation and liquidity creation in developing markets.

The previous chapters in this thesis have used regulation as a control, while studying the impact of traditional bank characteristics and traits unique to MFI institutions, and both seemed to indicate a persistent positive correlation between regulatory status and liquidity creation. In this chapter, however, I take a closer look at the regulatory framework, and attempt to identify exactly what mechanisms within it drive the positive correlation with LC. In addition, I used Barth's updated index, based on World Bank surveys from 2003, 2007 and 2011, to identify the specific mechanisms within the regulatory framework, which impacts levels of LC (Barth et al., 2013). The chapter thus contributes to the existing literature, by providing further insight into the impact of regulation on financial activity in general, and in the context of development research in particular. In addition, it provides a first insight into the dynamics between regulation and supervision of the microfinance sector, and its impact on MFI liquidity creation.

Because there are huge geographical differences in the scale and scope of applied regulation, I use a two-tiered approach to cast light on regulation from different angles. First, I estimate the impact of regulation and supervision, using a cross-country approach, with MIX panel data, similar to the models used in the previous 2 chapters. Second, I split the sample into regional pools, and look at the impact of regulation in Latin America, Africa and South Asia respectively.[76]

Consistent with the findings presented in the previous two chapters, I observe a strong, positive correlation between regulated status and level of liquidity creation. Across all 4 measurements for LC used, I find no negative correlation between the level of capital stringency imposed and levels of liquidity created by the individual MFI. In addition, LC measurements are negatively associated with increased risk-taking, if not consistently correlated.

The findings suggest that improved regulatory frameworks may help reduce external risk for microfinance institutions, and increase their ability to extend liquidity to the surrounding market. From a policy point of view, this is important, because capital requirements and the imposition of supervisory standards often come under fire for curtailing the ability of financial institutions to act optimally to changing conditions in the financial market. However, based on the consistent results and strength of correlation, it appears that the benefits from increased stability and safety brought by better regulatory frameworks should outweigh the concerns about limited MFI movement.

The chapter is structured as follows. Section 6.1 provides an overview of the key literature on regulation in general, and in development in particular. The section also provides a brief discussion of the particulars of the selected regions studied. Based on the discussion and identified gap in literature, the research question and hypothesis are discussed in 6.2. 6.3 presents the empirical models, and 6.4 discusses the use and limitations of the data sample. I present my results in section 6.5 and offer some concluding remarks on the implications for policy and practice in 6.6.

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[76] A country-level tier was considered as well, but ultimately rejected due to data sparsity.

6.1. Literature

In the following, I briefly discuss the key literature on regulation, with particular focus on the impact of regulatory and supervisory systems in developing countries. While chapter 2 also briefly discusses regulation as it pertains to macroeconomic impact research in microfinance, the following provides additional depth to the discussion, and by focusing on empirical findings.

I define regulation here as *the presence of a set of laws and rulesets, applicable to the banking sector in general, or the microfinance sector in particular, which is put in place to ensure prudential activity on the part of the MFIs, by restricting the behaviour of the industry*. Under the regulatory umbrella, supervision is further specified as *the monitoring of bank activity by the regulatory agencies, as well as the enforcement of the regulatory framework.*[77]

Microfinance institutions are not homogenous in their organisational structure, and range from commercial banks and non-bank financial institutions, to credit unions and cooperatives, as well as non-profit non-governmental organisations (NGOs). The intermediaries can thus be both regulated and unregulated, and operate in countries which have very different levels of regulatory frameworks and supervisory mechanisms.

6.1.1. Monopolies, Asymmetric Information and Moral Hazard

According to Freixas and Rochet, regulation is primarily needed to address the risk of market failure, due to asymmetric information, negative external influence and market powers (Freixas and Rochet, 2008).[78] Due to the lack of alternative financial providers in the rural areas within which MFIs often operate in, there can be cases where MFIs effectively end up operating as monopolies in their respective local environment (Hartarska and Nadolnyak, 2007). The presence of a limited number of actors in the microfinance market can be problematic for a number of reasons. First, some literature has suggested that the absence

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[77] For further discussion of the definition of regulation and supervision, please see Llewellyn, 2001; Spong, 2001 and Ly, 2013.

[78] For further in-depth discussions on regulation in traditional banking, see Dowd (1996), Benston and Kaufman (1996), Goodhart et al. (2013) and Barth et al. (2004).

of competition is negatively correlated with financial performance of MFIs (Cull et al., 2009b). Second, and equally important, competition is, especially for commercial MFIs, one of the primary incentives to keep interest rates from reaching usurious levels (Fernando, 2006).

Certain state interventions attempt to address this, by creating a regulatory framework which encourages competition and helps ease the entry-level barriers for new industry initiatives and pushes interest levels down. These have historically included the prevention of monopoly pricing through caps on interest levels. Critics of regulation have since argued that this form of intervention caused banks to focus their attention on richer clients to save on screening and monitoring costs, which resulted in a shift of resources from poor to rich clients. Furthermore, the same rich clients often nevertheless defaulted on their subsidised credit loans, causing the entire system to fail over time (Hartarska and Nadolnyak, 2007; Gonzalez-Vega, 1999).

In addition to the prevention of monopoly, regulation is often put in place to address issues arising from information asymmetry between the financial institutions and its depositors (Freixas and Rochet, 2008). Depositors require a certain measure of protection because they as a unit have access to incomplete information and cannot effectively monitor the decision- making of the bank's managers. Some literature argues that regulation is able to protect the depositors and their interests, by defining the framework for bank decision- making, typically through regulation related to institutional solvency (Dewatripoint and Tirole, 1994; Hartarska and Nadolnyak, 2007).

Voices critical of regulation caution against the risk of raising entry-level costs, especially in fledgling industries, and some argue that the presence of formal regulation may cause moral hazard. By reducing the risk for the financial institution, it is suggested that regulation may encourage rather than limit risky behaviour (Macey and O'Hara, 2003; Christen et al., 2004). In developing economies, the counter-argument is that regulation ultimately lowers cost by reducing external uncertainty and risk, and though findings cover the entire range of possible outcomes, there is general consensus that the external context and environment is important when studying the behaviour of financial institutions (Gorton and Winton, 2002; Mersland and Strøm, 2008)

In the specific context of MFIs, the understanding of regulatory influence becomes increasingly important because of the diversity in institutional makeup, size and primary

mission objectives (Hartarska and Mersland, 2012). Furthermore, some literature argues that the increased push for formalisation and commercialisation of microfinance intermediaries may be a mistake. The argument is that formalised networks of microfinance institutions may hold an interest in promoting regulatory frameworks in order to reduce new competition by raising entry barriers into the market, and steering investments from state actors and donors toward a smaller number already well-established actors (McIntosh and Widyck, 2005; Hartarska and Nadolnyak, 2007).

Increasing our understanding of what constitutes satisfactory performance for the individual MFI will help inform the decision-making process for policy-makers, and help design prudential regulatory strategies, regardless of what that strategy may be.

6.1.2. The Regulation of Capital Stringency

Capital requirement is one of the most important areas of financial regulation, in that it is directly related to the intermediary's risk management strategies, and its ability to absorb shock (Thakor, 2013). As link between lender and investor, the very function of banks and other financial intermediaries is to shoulder the worst of the risk associate with maturity and liquidity transformations (Bhattacharya and Thakor, 1993; Hellwig, 1994). However, while there is general agreement that the area is a key portion of the very reason to have banks in the first place, there is little consensus on what, if any, formal regulatory frameworks should be put in place to ensure prudent capital ratios.

Recent literature, using the Berger and Bouwman measurement of liquidity creation, is a 2013 study of Czech banks from 2002 to 2010, by Horvath, Seidler and Weill (Horvath et al., 2013). The authors look specifically at the causal relationship between capital and liquidity creation, by running a series of Granger-causality tests.

Like Berger and Bouwman, they find a consistent increase of liquidity creation through the observed period, and note negative impact on liquidity creation by capital in the Czech banks, which fall within the 'small' category of Berger and Bouwman. They also find a negative impact of liquidity creation on capital, and argue that too high levels of liquidity creation can be detrimental to the financial health of the intermediary as well, suggesting a trade-off relationship between the liquidity created by the intermediary, and its financial

stability. Tighter capital requirements appear to reduce the level of liquidity created, but alternatively, high levels of liquidity creation may impair the solvency of the intermediary (Horvath et al., 2013; Diamond and Rajan, 2001).

However, other literature does not support the suggestion that tighter formal capital requirements necessarily affect the performance of financial intermediaries. Rather, in recent empirical studies it has been associated with higher levels of liquidity creation, higher resistance to shocks, higher bank values and higher lending (Holström and Tirole, 1998; Berger et al., 2011; Beltratti and Stulz, 2009; Mehran and Thakor, 2011). Since higher leverage is associated with higher systemic risk, Thakor argues that higher capital ratio requirements are necessary to reduce the potential for a sovereign debt crisis, by strengthening the 'in-house' deposit insurance with mandatory held capital (Thakor, 2013).

6.1.3. Regulation and Liquidity Creation

In 2011, the International Monetary Fund noted that banks typically failed in the 2008 financial crisis due to poor liquidity management and too heavy reliance on short-term wholesale funding, which accelerated the failure of weakened banks and financial institutions (IMF, 2012). Previous research suggests that various regulatory and supervisory systems impacted the performance and risk profile of the affected financial intermediaries (e.g. Thakor, 2013; Hartarska and Nadolnyak, 2007; Barth et al., 2013).

Understanding the relationship between regulation and liquidity creation in a development context is important for two reasons. First, the cost associated with creating and enforcing prudent regulation and supervision is substantial, especially in a developing country. The literature evaluating the relative cost of regulatory systems against the impact of regulation does not, however, present conclusive results (e.g. Barth et al., 2004). A 2003 study by Steel and Andah, examining the cost and impact of regulation in Ghana, found that the cost in fact can get so high that it may not be worth the resulting impact on financial behaviour (Steel and Andah, 2003). However, studies of regulation in Latin America found that the benefits of strong regulation well outweighed the associated cost (e.g. Gonzales-Vega, 1995; Theodore and Loubiere, 2002).

Second, the nature of the correlation regulation and performance parameters such as liquidity creation is a strong indicator to policymakers of how the most efficient regulatory framework should look and operate. In investigating the relationship between regulation and bank performance, Barth et al. found there does not appear to be correlation between bank performance and regulatory power (Barth et al., 2013). Echoing similar findings for the microfinance sector, Hartaska finds that regulation does not appear to have significant impact on the level of operational self-sustainability in MFIs (Hatarska and Nadolnyak, 2007). However, Hartarska does note that regulation has an impact on outreach and deposit levels, a finding that is likely to influence the level of liquidity created by the MFI.

Studies have observed a negative relationship between bank performance and traditional banking institutions holding large amounts of liquid assets (Ly, 2013; Arif and Nauman, 2012; Bordeleau and Graham, 2010). However, this does not mean that that the impact of prudent regulation and supervisory impact is necessarily negative. In fact, some of the same studies also found that regulatory and supervisory policies impacting the risk-taking behaviour of the intermediaries were positively related to bank performance (Ly, 2013). The same study finds a negative relationship between deposit-insurance and performance, though results from other studies appear to contradict this (e.g. Schaefer and Deep, 2004).

The majority of studies seeking to evaluate the impact of regulation and supervision in microfinance focus on one particular country or cluster of countries, or one particular case. The limited focus follows the argument that because of the significant differences between regions and countries, it is questionable whether experience from one geographical region may be transferred to another.[79] Because the state of the 'enabling environment' varies from region to region, and country to country, universal statements about regulation hold little value (Cuevas, 1996). However, other research argues that a cross-country approach can be used, because institutional quality has been shown to impact overall economic growth (Hatarska and Nadolnyak, 2007; Assane and Grammy, 2003).

Empirical literature studying the relationship between liquidity creation and the impact of regulatory frameworks is still extremely scarce. However, Berger et al. provided some first insights, using data from Germany over a 10 year period. The authors find that both

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[79] For surveys of case study literature on regulation, see Brau and Woller (2004), and Arun and Hulme (2008).

regulation and capital support reduce the bank's risk aversion, and argue that this in turn leads to lower levels of liquidity creation (Berger et al., 2016).

However, other research suggests that results may vary significantly based on size and the external conditions that the intermediaries operate in. Distinguin et al. found that in US and European publicly traded commercial banks, smaller banks behaved significantly differently from larger banks when it came to liquidity creation and behaviour when facing increased illiquidity, thus requiring a nuanced regulatory framework (Distinguin et al., 2013).

In other literature, the need for regulation of capital requirements is discussed. Theoretical literature disagrees on the need for higher capital requirements in financial intermediaries, but the empirical evidence suggests that higher capital requirements are associated with higher levels of liquidity creation, as well as better ability to absorb shock (Thakor, 2014).

Ultimately, however, the existing peer-reviewed literature has focused on intermediaries operating in well-developed financial markets, where the impact of regulation may take on a different role than in less-developed and riskier markets.

The following expands the existing knowledge, by providing some first insights into the impact of regulation on small financial intermediaries, specifically in a developing and emerging market context. This study incorporates and tests the relationship between liquidity creation and regulation using cross-country results, as well as data subsets limited geographically to region (Latin America, South Asia and Sub-Saharan Africa).

6.1.4. Regulation in Latin America

The Latin American region covers 41 countries, with fairly diverse levels of economic and financial market development. Compared to other emerging and developing regions, however, Latin America's economic growth and development is generally considered strong. The region got through the 2008 financial crisis reasonably well, and has had consistent and stable economic growth over the last few decades (Lewis et al., 2015). In terms of financial infrastructure, mobile networks and regulatory meso-level institutions, the region generally fares well.

The region is not without challenges, however. Latin America is, along with Sub-Saharan Africa, the region with the highest income inequality of the 6 developing regions defined by

the MIXMarket database[80], a gap especially evident in Brazil and Chile, which also represent the stronger economies of the region (Martinez, 2015; Lewis et al., 2015).

Latin America has one of the higher levels of financial access amongst developing and emerging markets, with 39.2% of adults having some form of account with a formal financial intermediary (Martinez, 2015). However, according to CGAP it is still more common to take an informal loan with friends and family, than with a formal financial institution (27.2% vs 8.6%), and mobile payments remain at just above 1% (Martinez, 2015; Faz and Breluff, 2012). Nevertheless, while there is consensus that Latin America's financial infrastructure is generally good and continues to improve, whether the regulatory systems put in place help or hinder the region's microfinancial activities, is a matter of some debate.

Some research and practitioner reports suggests that the benefits of regulation in the region may not outweigh its costs (e.g. Theodore and Loubiere, 2002; Hartarska and Nadolnyak, 2007), while others find regulation of especially deposit-taking institutions crucial, pointing out that its absence can become extremely costly (e.g. Wright, 2000; Chaves and Gonzalez-Vega, 1994). However, most academic and practitioner research find a wide array of both opportunities and challenges for microfinance in the region (e.g. Hartarska and Nadolnyak, 2007; Lewis et al., 2015; Christen, 2002). The region has shown continuous growth of its financial sector and infrastructure. The number of formal bank accounts rose by 12% from 2011 to 2014, and in 2014, Latin America grew its mobile financial accounts and infrastructure more than any other region globally (Crowther, 2015; GSMA, 2015). In addition, GSMA found that an impressive 27% of the mobile transfers were so-called "eco-system transfers", which involve a third party, such as a merchant or bill payment (GSMA, 2015).

This development has been supported by the implementation of a number of recent regulatory changes, developed to encouraged diversification of financial service providers (Lewis et al., 2015). However, despite this, there are still areas in need of increased transparency and strengthened enabling infrastructure, such as supporting meso-level institutions (Gonzalez and Rosenberg, 2006).

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[80] These regions are: Latin America and the Caribbean (LAC), Sub-Saharan Africa (SSA), Eastern Europe and Central Asia (EECA), Middle East and North Africa (MENA), South Asia (SA) and East Asia and Pacific (EAP).

6.1.5. Regulation in East and South Asia

Generally, both East and South Asia are considered some of the better developed regions in terms of microfinance infrastructure, access and regulatory framework (APF, 2017). While the national actors are very diverse and come with unique perspectives on modern financial development, a common trait in microfinance is the evidence of a generally prosperous and innovative sector, despite tumultuous events at times disrupting the move forward (Demigüc-Kunt et al., 2017; APF, 2017).

India houses one of the fastest growing microfinance industries globally, but has recently struggled to deal with examples of usurious lending practices deepening rather than relieving client debt, as well as cases of extensive state corruption in parts of the country (APF, 2017).

In Bangladesh, the industry continues to do well, but has also experienced increased friction and struggles for control, especially between the state and the primary actor and first mover Grameen Bank (Kumar et al., 2015).

In general, the South Asia region faces a microfinance market which is changing, and policymakers are being asked to adapt the current regulatory framework to new and increasingly complex realities. New products, technologies and methodologies are being introduced by the industry, and some parts of the region are adapting faster than others. In Pakistan, the embrace of microfinance by mobile operators and the introduction of new commercial players have pushed industry growth forward (APF, 2017).

Across the region, however, there is a continuous effort to improve the clarity and transparency of regulatory frameworks (Demigüc-Kunt et al., 2017; Kumar et al., 2015). Efforts to protect savings are quite well developed in South Asia, though recent recommendations to policymakers include cross-border streamlining of frameworks and data collection, as well as increased attention to the challenges and opportunities associated with a growing interest in and use of distributed ledger technology (DLT) in microfinance (APF, 2017).

6.1.6. Regulation in Sub-Saharan Africa

The Sub-Saharan region covers 41 countries on the African continent south of Sahara, and is the developing region which holds the highest levels of poverty; about 50% of the region's inhabitants still live below $2 a day (UNDP, 2016). Poverty rates are in decline, but there is still a long way up to the average living standards of other emerging and developed markets around the globe. Despite the continuous struggles with deep poverty, and despite widely diverse tribal communities and culture, the region has, however, displayed continuous economic growth over the last decade (CGAP, 2016).

Nevertheless, the list of challenges, both in terms of general economic development, and in relation to microfinance specifically, remains very long. The financial infrastructure in Sub-Saharan Africa is weak, and there is an abject lack of registries and databases to help reduce institutional risk in lending (IMF, 2012). A significant portion of the adult population remains unbanked, with as few as approx. 34% holding a bank account with a formal financial intermediary; this is only half the amount of the global average (EIB, 2017).

The institutions involved in microfinance in Sub-Saharan Africa are many and differ significantly in structure and objective. NGOs and rural banks operate in same environment as formal commercial banks, cooperatives and other for-profit financial intermediaries. The diversity in organisational makeup constitutes a significant challenge to policymakers, who are interested in streamlining regulatory and supervisory frameworks, both nationally and across the region. However, the (slow) rise of cross-country regional organisations may help over time, both in terms of highlighting the need for cross-national streamlining of regulatory frameworks and technological advance, but also with regional competition (World Bank, 2018).

A large part of the reason for the high level of unbanked is the scattered markets and the lack of meso-level support in the financial system, which could help reduce the bank risk associated with lending activities. In the absence of traditional lending, microfinance institutions seek to reach the previously unbanked, especially in rural areas, and as was shown in the previous chapter, use innovative lending methodologies to reduce the risks traditionally associated with collateral-less loans. In addition, international donor agencies

are focused on strengthening the macro- and meso-level environment to encourage industry growth (CGAP, 2013; IMF, 2012).

6.2. Research Questions and Hypotheses

In existing literature, there appears to be a general consensus that the external environment has direct impact on the financial intermediaries operating in said environment, and that this impact increases with higher volatility and uncertainty (Hartarska and Nadolnyak, 2007; Barth et al., 2008; Agoraki et al., 2011; Aiyar et al., 2014).

However, there is a lot less consensus regarding the impact of state intervention in the form of formal regulatory frameworks and requirements concerning capital stringency. In addition, there exist very few studies looking at the relationship between regulation and liquidity creation in traditional banking literature, and so far, no previous study has looked at the relationship between regulation and liquidity creation in developing and emerging markets, or specifically focused on microfinance intermediaries.

This study seeks therefore to add to the existing literature on regulation in developing countries in general, and offer a first insight into the impact of prudent regulation on liquidity creation in microfinance intermediaries, by answering the following research question and sub-questions:

1: What is the cross-country and regional impact of regulation on the level of liquidity created by microfinance institutions?

> *a) How does the stringency of capital regulation impact liquidity creation in microfinance?*

Due to the large differences in levels of development and financial regulation across geographical regions, I estimate both the cross-country impact of regulation as a whole, as well as run similar estimations in which the data pool is narrowed by region to 3 regions: Latin America, South Asia and Sub-Saharan Africa.

The regional estimations include similar variables, but will help inform the following sub-questions:

b) What, if any, regional differences are evident in the impact of regulation on liquidity creation in microfinance?

c) How does the external environment and developing market characteristics impact the regulatory framework and liquidity creation?

6.2.1. Hypotheses

While the findings concerning the effect of regulation in developing regions have been somewhat ambiguous in existing literature, the modest handful of studies examining the relationship between liquidity creation and traditional banking suggests that, at least in well-developed financial systems, regulation and capital stringency is associated with lower levels of liquidity creation (e.g. Thakor, 2013; Hartarska and Mersland, 2013; Sheremenk et al., 2017).

While the risk profile of developing and emerging markets is significantly different, the findings in traditional intermediaries would suggest that a stronger regulatory framework is associated with lower levels of liquidity creation in microfinance institutions.[81] However, the unique and highly volatile conditions under which microfinance institutions tend to operate, may well constitute a situation in which the impact of unique development conditions show positive effects from risk-minimising regulatory efforts.

The additional cost associated with regulatory requirements may also cause the entry barrier for new players to become too high. Some literature has found that disclosure requirements are negatively correlated with efficiency and performance, due to the costs of preparing and releasing the documents, as well as the costs associated with making sensitive information available to competitors (Berger et al., 2004).

Based on the results found so far between liquidity creation and regulation, I expect that

H1. Regulation is likely to decrease liquidity creation.

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[81] However, it should here be noted that other studies, such as Pasiouras et al., 2009, and Chortareaset et al., 2011, find positive correlation between bank performance and the presence of formal regulatory frameworks.

Given the large economic and developmental differences between different regions engaged in microfinance and the findings in previous literature, expect to find differences in the impact of regulatory frameworks, based on the regional socio-economic status quo (Gorton and Winton, 2002). Regulation may, for example, have a positive effect as risk-reduction tool in regions with high uncertainty, while the impact may be adverse in regions where the added expense of additional monitoring and supervision creates undue costs for its actors (Hartarska and Nadolnyak, 2007; Hartarska and Mersland, 2013).

It is therefore expected that:

H1a: The impact of formal regulatory frameworks on liquidity creation will differ from region to region,

And that:

H1b: The impact of regulation on liquidity creation is negatively correlated with HDI and GDP growth.

6.3. Methodology

Studies have found that the external macro-environment affects the performance and behaviour of the individual micro- and meso-level institution, as does the presence of an enabling environment (e.g. Barth et al., 2008; Hartarska and Mersland, 2013; Cull et al., 2009). For these reasons, it is both relevant and important to study the cross-country and regional effects of regulation on liquidity created for the market.

The estimations presented in this study all use panel data, and in accordance with most quantitative development research, the empirical analysis expresses the 4 liquidity creation measurements (LnLC, LC/GTA, LC/E and LC/GLP) as functions of a set of independent institutional, developmental and macroeconomic variables (e.g. Barth et al., 2004; Cull et al., 2009; Hartarska and Nadolnyak, 2007).

Prior to running the estimation models, a Hausman specification test was done to determine the most appropriate estimation model for the desired variables, and as in the previous chapters, the test's statistical significance rejects the null hypothesis that a random model is appropriate.

In OLS estimations, there is an inherent risk of under-estimating errors, due to observations from same intermediary and geographical area being similar (Cull et al., 2009). To address this, I include country fixed effects to control for unobservable effects across countries that are not captured by the other independent variables and to reduce correlations across error terms.[82] Similarly, I have included time fixed effects to account for average differences in liquidity creation across years (and are not captured by the rest of the exogenous variables), and to remove possible serial correlation problems.

All estimations are run using robust standard errors, which are clustered by MFI, to account for heteroscedasticity, as well as possible correlation among observations of the same intermediary in different years.

The variance inflation factor (vif) returns values between 1.04 and 1.46, which with the inclusion of 8 to 10 variables is well below the accepted threshold and indicates no concern for possible multicollinearity[83].

To answer the 3 research questions and sub-questions above, I run two-way fixed effects models, in which the correlation between levels of liquidity creation and a range of microfinance-, development and macro-specific variables are estimated. I am here particularly interested in the impact of regulation, supervision and capital stringency.

Following a methodology similar to that used in the previous chapter, I use panel data from MIX, here specifically to estimate the institutional impact of formal regulation and capital stringency on levels of MFI liquidity creation. While I do include a number of general institutional traits which existing banking and microfinance literature suggests are relevant for the creation of liquidity in financial institutions, I am primarily interested in the micro-,

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[82] A Hausman specification test was performed as well, in which the prob>chi2 was significant at 0.0000 for the cross-country dataset and between 0.000 and 0.0048 for the 3 include regions. The null hypothesis was therefore rejected in favour of fixed effects estimations.

[83] In addition to the vif test, correlation matrices were created for all regressions in the dissertation, with upper limits set to 0.4. As can be seen in Appendix E, no correlation among the independent variables breaches this limit.

meso- and macro characteristics which are either unique to or of particular importance to development research in general and the microfinance industry in particular.[84]

6.3.1. Cross-Country and Regional Estimations

To investigate the relationship between the regulatory status of the individual MFI i and levels of liquidity created by same intermediary, I run a series of estimations using the following fixed effects model:

Equation 6.1: Liquidity Creation and Regulation (cross-country), DV I-III

$$LIQ_{it} = \alpha + \beta_k REG_{kit} + \delta_1 CAPITAL_{it-1} + \delta_2 it - 1 + \delta_3 AGE_{it} + \delta_4 AGE2_{it} + \delta_5 RISK_{it-1}$$
$$+ \delta_6 NGO_{it} + \delta_7 CAPSTR_{it-1} + \delta_8 INFL_{it} + \delta_9 GDP_{it-1} + \delta_{10} HDI_{it} + f_j + T_i + \varepsilon_{it}$$

where REG_{kit-1} captures the effect of regulatory status in MFI I for period t. As in the previous empirical chapters, LIQ represents one of the following measures of liquidity creation of MFI i in period t: pure, absolute liquidity creation (LC), LC scaled by total assets (LC_GTA), liquidity to equity (LC_E) and liquidity creation to total loans (LC_GLP).

In all estimations, the pure values of liquidity creation have been deflated using the World Bank' Consumer Price Index (CPI).

To address potential concerns of serial correlation and heteroscedasticity, the robust standard errors are clustered at MFI level, in an effort to address possible serial correlation and heteroscedasticity concerns. In addition, all time-variant independent variables in the estimations are lagged one period, to account for potential endogeneity problems.

As in the previous chapter, I measure liquidity creation using a cross-country approach, but recognise that especially in the case of the regulatory framework, there is likely to be significant country-level differences in the creation of liquidity. Some of these effects are

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[84] For a more in-depth discussion of the impact of traditional bank on FI traits and conditions, please see the discussion presented in chapter 4.

captured by specific macroeconomic controls (GDP, HDI), but I also include country-level fixed effects to capture the unobserved geographical traits over time. f_j is therefore a vector of country-level dummies, defined geographically using the specification for country defined by the MIX database.

Finally, in addition to the fixed effects at country level, I have included a time trend (T_i) to capture any unobserved changes over the time. ε is a stochastic error term. α is a constant term. β and δ are the unknown coefficients to be estimated. The subscripts *i* and *t* refer to MFI and time, respectively.

Table 6.1: Variables and Definitions

Variable	Definition
Liquidity creation (log)	Log of the pure liquidity creation value, deflated using the CPI Index.
LC/GTA	Liquidity creation scaled by size.
LC/E	Liquidity creation scaled by equity.
LC/GLP	Liquidity creation scaled by total loans.
Regulated	Regulation is a dummy variable indicating whether or not the specific MFI is subject to formal regulatory measures. The value is 1 if the MFI is formally regulated, 0 if not.
Capital	Measured as the ratio of equity to total assets.
Size (log)	Measured as a log of the MFI's total assets.
Age and Age2	Age of MFI, measured as year y minus the year of establishment. Age2 is age squared.
Bank risk	Bank risk, measured as the ratio of portfolio at risk, 30 days, to GLP.
Capital stringency	Index based on World Bank survey data, collected by Barth et al, 2013.
Inflation	Macroeconomic variable using IMF data.
GDP Growth	The percentage of change in the GDP deflator, using data from the International Monetary Fund (IMF)
HDI	Human Development Index. Index maintained by UN.

In models 2, 3 and 4, the sample has been limited to only include one of the 3 geographical regions: Sub-Saharan Africa, Latin America and South Asia. The selection of the 3 regions was based on the highest number of available observations. The results from 2 of the remaining 3 regions, East Asia and Eastern Europe, are qualitatively the same as the 3 regions used in the chapter, and can be found in appendices C and D. Please note that the

level of observations from Eastern Europe is below the recommended threshold of minimum 20 observations per predictor (Kling et al., 2007).[85]

6.3.2. Independent Variables

In the case of development research, there is, perhaps more so than in other financial sub-sectors of research, a need to weigh the included controls against the consequent reduction in available data. As before, all pure time-variant values have been deflated using the CPI, and all exogenous time-variant variables have been lagged one-period to address potential endogeneity concerns, and identify a causal relationship between the variables, beyond simple correlation.

Regulatory status (REGULATED): The key independent variable tested is the regulatory status of the individual intermediary. The status is provided by MIX Market, and is relative to the individual MFI. This is important, because in microfinance, it is common to have both formal and informal actors, of extremely varying sizes and reach. This is for example the case in Tanzania, which regulates microfinance institutions differently depending on their asset and/or loan size (Jensen, 2009).

In terms of MFI-specific variables, I include controls for age, size, capital and bank risk.

Age (AGE and AGE2): The age of the individual intermediary is included, and is calculated as year t minus the years of establishment. Previous literature has suggested that microfinance goes through different organizational phases as they mature (Bogan, 2012a and 2012b; Ngo, 2012; Helms, 2006; Farrington and Abrams, 2002). Based on this assertion, I have included both age and age-squared, to test for a non-linear relationship.

Size (SIZE): Following common practice in financial research and bank performance specifically, the size variable is calculated using the one-period-lagged logarithm of the individual MFI's total assets.[86] Size is included because a number of studies, both in microfinance and related to liquidity creation, suggests that the size of the intermediary has

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[85] I was not able to run results for the Middle East and North Africa, due to lack of usable observations.
[86] See, for example Cull et al., 2009.

impact on the level of LC created, when scaled by size, equity and GLP, but that the nature of the impact may change depending on asset volume (e.g. Berger and Bouwman, 2009; Athanasoglou et al., 2008; Horvath et al., 2013). However, based on the inconsistency of previous findings in small financial intermediaries, I expect the relationship to be weakly negative or insignificant

Capital (CAPITAL): Capital has also been included, and is defined at the MFI's one-period-lagged equity ratio, that is equity to total assets. Previous findings indicate a negative relationship between capital and liquidity creation in smaller intermediaries, a finding consistent with my own previous findings. Although some literature finds a positive correlation between capital and general profitability, I expect the relationship here to be negative (Berger and Bouwman, 2009; Berger et al., 2011; Horvath et al., 2014; Hartarska et al., 2013).

Bank risk (RISK): I control for bank risk (RISK), which is measured as the one-period-lagged ratio of portfolio at risk > 30 days to the MFI's gross loan portfolio.[87] Both within and outside development research, a good amount of both theoretical and empirical work can be found, studying the relationship between regulation, bank risk, vulnerability to shock and intermediary performance.[88] Bank risk is particularly relevant to control for, since the assumption of some literature is that MFIs may over-produce liquidity, by taking undue risk. If this is the case, it should be reflected in the portfolio at risk (Berger et al., 2011; Horvath et al., 2014).

Capital stringency: The impact of the most recent financial crisis in 2008 has put the spotlight back on the role of the regulatory framework as a tool to secure financial stability, and in that debate the role of capital and capital stringency has taken centre stage (Thakor, 2013; Naceur and Kandil, 2009). However, whether this has adverse effect on liquidity

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[87] Portfolio at risk represents the value of the MFI's loans outstanding, here with at least one instalment, which is more than 30 days past due. PAR30 includes the entire unpaid balance, but excludes loans which have been rescheduled or restructured (CGAP, 2003).
[88] See, for example, Diamond and Rajan, 2001; Gorton and Pennachi, 1990; Berger and Bouwman, 2009; Agoraki et al., 2011.

creation is still a matter of some debate. Thakor argues that higher capital ratios are empirically associated higher levels of lending, and with it, higher levels of liquidity creation (Thakor, 2013). Supporting this, empirical work by Beltratti and Stulz found positive correlation between bank performance and higher levels of capital stringency (Beltratti and Stulz, 2009).

On the other hand, Aiyar, Calomaris and Wieladek argue that regulated UK banks reduce lending in the face of stricter capital requirements, whereas unregulated foreign banks increase it (Aiyar et al., 2013). And similarly to this, VanHoose found that higher levels of capital stringency may induce intermediaries to replace lending activities with less risky asset alternatives (VanHoose, 2007).

In this study, capital stringency is measured using Barth et al.'s capital regulatory index (Barth et al., 2013). The index uses data collected from 4 World Bank surveys with over 300 questions, covering a period from 1999 to 2011. The index employs a scale from 0 to 9 to measure levels of capital stringency (where higher values indicate greater stringency). This is part of a larger dataset of regulatory and supervisory data points, collected by Barth from regulatory officials, economists and World Bank staff (Barth et al., 2013).

GDP growth (GDP): A measure for annual GDP growth is used here, together with HDI, as a macroeconomic indicator of country-level development. The indicator is included to control for external macreconomic conditions, which could well influence the impact of regulation on LC (Demirgüç-Kunt and Detragiache, 2002). The indicator uses data sourced from the IMF macroeconomic database.

Inflation: Inflation is included as a macroeconomic control, to see if higher levels of inflation impact levels of liquidity creation, by contributing to the volatility and contextual uncertainty of the individual MFI's external reality. Previous studies have found a positive correlation between levels of inflation and MFI performance, but I am not convinced that this will be the case here, given its contribution to overall market uncertainty.[89] The data used on inflation is provide by the International Monetary Fund (IMF), and is expressed in constant 1995 USD.

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[89] See Demirgüc-Kunt and Huizinga, 1999; Hartarska and Nadolnyak, 2007.

Human Development Index (HDI): The Human Development Index (HDI) is a composite index developed by the UNDP, designed to capture development beyond simple macroeconomic measures. The index combines scores for education, income (GNI per capita) and health (life expectancy), to express a measure of broader human development and well-being (UNDP, 2016). The measure is used in this study to capture external conditions, beyond economic growth, which are likely to impact institutional performance and liquidity creation.

6.4. Data

The study uses MIX data stretching over an 8 year period from 2004 to 2012.[90] The data covers 1121 MFIs, from a total of 110 countries.[91] The empirical model used specifies liquidity creation as a function of a combination of institutional, regulatory, macroeconomic and development variables at country level, and a range of financial variables specific to the individual MFI.[92]

Time-variant values have been winsorized at 1 and 99%, to reduce the effect of spurious outliers. In addition, duplicates, empty data points and faulty or ambiguous data have been removed, and the data includes deposit-takers, as well as institutions with a minimum asset pool of $1000[93].

As liquidity creation is measured by looking at the transformation of liquid liabilities to illiquid assets, I use just deposit-taking institutions. In addition, I have removed microfinance institutions with negative equity, on the basis that a financial intermediary close to financial insolvency is likely to focus primarily on securing short-term capital, and is therefore likely to adapt and change its behaviour and investment strategies to the financial status quo.

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[90] Earlier years were excluded due to high dispersion of data and very low levels of reliability, and newer years were excluded due to incompletion at the time of the data gathering.

[91] The full database covers 3800 MFIs, with observations from 2004 to 2012, in 118 countries. The coverage in 2012 is about 12.5% of the estimated 10,000 MFIs currently in existence, and about 50% of all borrowers.

[92] MIX Market's data is at risk of selection bias, given the lack of mandatory reporting. The database is nonetheless the primary data source for most peer-reviewed literature, given the general shortage of adequate industry alternatives.

[93] All data treatment and regression work has been done using Stata, version 11 and 15.

Table 6.2: MFI Summary Statistics, LC and Regulation

2004 - 2012	Number of Observations	Mean	Standard Deviation	Minimum	5th Percentile	Median	95th Percentile	Maximum
Dependent Variables:								
Liquidity Creation (Deflated)	3672	14.45 M	30.75 M	0.00 M	0.08 M	2.62 M	78.76 M	293.22 M
Liquidity Creation / Gross Total Assets	3672	0.33	0.16	0.00	0.06	0.32	0.61	1.81
Liquidity Creation / Gross Loan Portfolio	3672	0.48	0.53	0.00	0.10	0.44	0.93	21.85
Liquidity Creation / Equity	3672	2.10	1.79	0.00	0.15	1.65	5.84	9.95
Independent Variables:								
Regulation	3672	0.73	0.44	0.00	0.00	1.00	1.00	1.00
Capital	3471	3.71 M	8.59 M	0.00 M	0.00 M	0.38 M	20.11 M	103.88 M
Size	3672	15.95	1.89	7.17	12.96	15.86	19.25	19.96
Age	3672	5.83	3.05	1.00	2.00	6.00	11.00	14.00
Risk	3194	0.07	0.10	0.00	0.00	0.04	0.23	1.00
Capital Stringency	3157	4.23	1.92	0.00	0.00	4.00	7.00	7.00
Inflation	3323	8.12	5.55	-2.60	1.62	6.65	19.41	33.54
GDP Growth per capita	3368	5.55	2.84	-7.06	1.04	5.57	10.26	17.29
HDI	3227	0.58	0.11	0.28	0.37	0.59	0.73	0.83

The data used in the study has been drawn from 3 primary sources: The Microfinance Information Exchange (MIX), regulatory and supervisory indices developed by Barth et al. (2013), based on 4 World Bank surveys, and macroeconomic data from the International Monetary Fund (IMF).

6.4.1. The Microfinance Information Exchange (MIX)

The primary financial data used in this study, including the individual MFI's regulatory status, is collected from the Microfinance Information Exchange (MIX), the current, the current leading provider of microfinance data. MiX is which is maintained by a non-profit private organisation, aiming to increase the quality of information on microfinance institutions for the industry (Khamar, 2017).

Though the primary source of data used in most peer-reviewed articles on microfinance, the database often comes under fire for consisting of mostly voluntary and self-reported data. In the early 2000s when the MIX database was still young, the quality of the data was especially questionable, but as the organization has grown, the data has been cleaned extensively, and changed reporting procedures plus audited financial data has helped increase overall reliability. The MIX financial data quality is rated with a 5-tier diamond system, where 5 denotes the strongest and most complete financial data available, while 1 is the least.[94] To address persisting concerns related to the quality of data, I use audited financial data, ranked 4 or 5 in the database, despite the reduction of the sample pool available.[95]

6.4.2. The World Bank Regulatory Indices

Barth et al. has collected data from 4 comprehensive World Bank surveys on regulation and supervision in 180 countries, over a 14-year period, from 1998 to 2012. Based on 118 questions posed to regulatory officials, World Bank staff members, academics and country

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[94] The audit rules used by MIX include factors such as checking the balance of financial statements, and whether ratios are particularly high or low compared to its competitors.

[95] The only exception to this is the group of MFIs ranked 3, where financial documentation could be found elsewhere for verification.

officials, Barth et al, develop indices for a number of regulatory and supervisory values (Barth et al., 2013). These include the presence of state-level deposit insurance (used in chapter 4), and a regulatory index measuring levels of capital stringency, used in this chapter. In addition to deposit insurance and capital stringency, the dataset includes indices for external supervision and audit, transparency and governance (Barth et al., 2013).

6.4.3. UN and IMF Data

The macroeconomic variables used in the study are pulled from databases maintained by the United Nations (UN) and the International Monetary Fund (IMF). The Human Development Index (HDI) is collected and maintained by the United Nations Development Program (UNDP), and combined UN data on education, health and income. The Index, building on the work of economists Amartya Sen and Mahub ul Haq, is updated annually and draws on data from the UN Department of Economic and Social Affairs (UNDESA), UNESCO Institute of Statistics (UIS), The World Bank and the IMF. The macroeconomic variables drawn from the IMF, which publishes regular time series data on a range of economic topics, including GDP and GDP growth, inflation and exchange rates.

6.5. Results

Across all regions, the level of regulated MFIs in microfinance remains reasonably steady, making up roughly about three quarters of all microfinance institutions on average (figure 6.1).[96] The global ratio of regulated MFIs to unregulated is quite steady across the years, with only a 6% variance in the percentages from 2004 to 2012.

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[96] MENA has been included, but is less consistent than the other regions, primarily due to a smaller pool of observations (most years are < 20).

Figure 6.1: % Regulated MFIs by Region
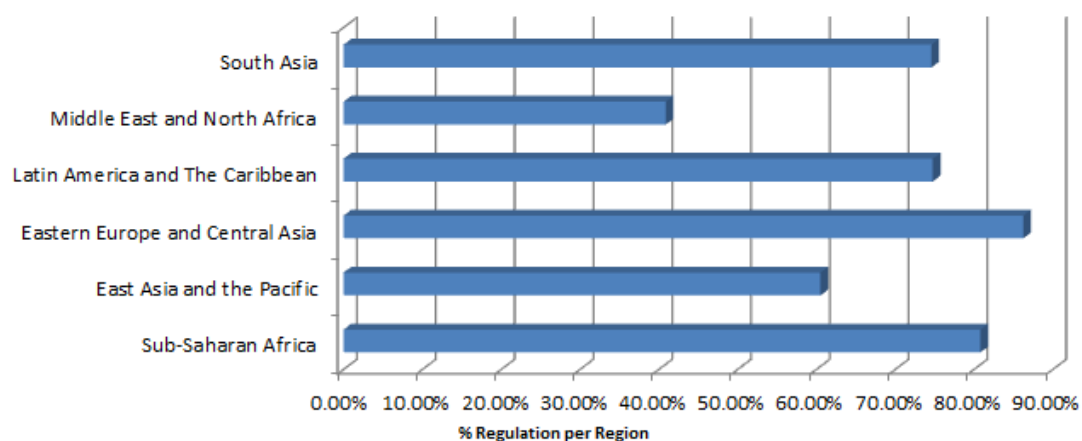
On average, the annual ratio regulated to unregulated deposit-taking MFIs lies consistently close to 3:1. Regionally, the largest concentration is found in Eastern Europe which, given the level of development and formalisation of the microfinancial market, is unsurprising.

6.5.1. Regulation by Type and Gender

While the portion of regulated to unregulated MFIs remains steady across years, there does appear to be a shift between types, with a consistent move towards a formalisation of existing MFIs.

Table 6.3: % Regulation by Type, per Region[97]

% Regulation by Type, per Region	Bank	Credit Union / Cooperative	NBFI	NGO	Rural Bank
Sub-Saharan Africa	96.88%	92.28%	80.74%	55.66%	87.32%
East Asia and the Pacific	82.35%	46.81%	74.38%	17.54%	91.92%
Eastern Europe and Central Asia	94.04%	85.00%	83.78%	10.00%	0.00%
Latin America and The Caribbean	98.63%	83.88%	80.64%	9.86%	0.00%
Middle East and North Africa	100.00%	0.00%	50.00%	33.33%	0.00%
South Asia	97.78%	69.44%	78.69%	65.81%	100.00%

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[97] Rural banks are missing from 3 regions, because the regulatory categories are slightly different. Formal banks, regardless of size and location, are included in the commercial bank category, while other financial institutions are added as NBFIs.

The ratio remains somewhat the same because the newly included institutions engaging in microfinance often start out as unregulated MFIs or NBFIs, but as time passes, they tend to change into for-profit institutions, typically submitted to higher levels of regulatory control (table 6.3). This trend is in line with observation found in the existing literature (e.g. Bogan, 2012; Helms, 2006).

Figure 6.2: MFI Regulatory Status by Organizational Type, 2004-2012
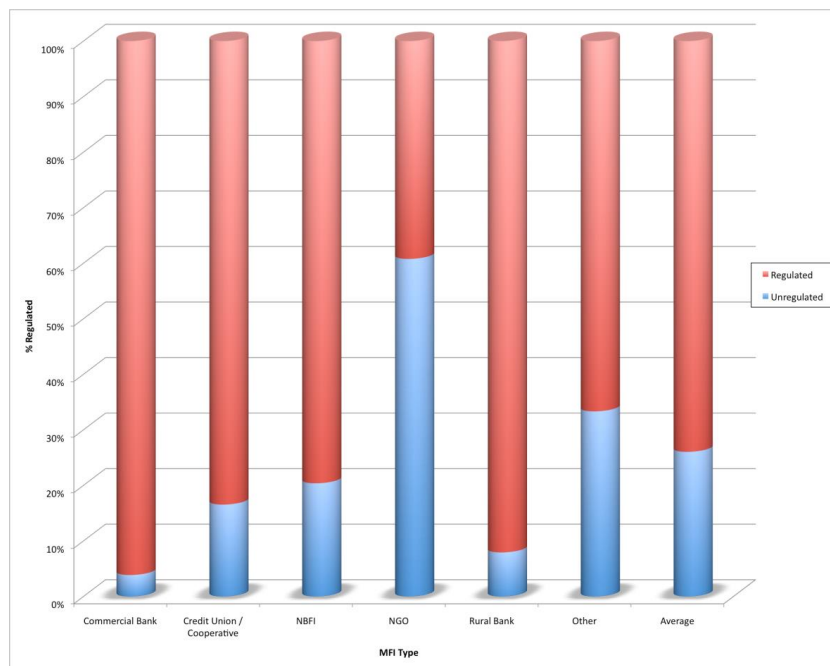
Across regions and years, the largest group of regulated institutions are unsurprisingly the commercial banks, followed by rural banks (typically formal branches, for example in the form of rural savings and credit associations) and credit unions. NGOs are by far the smallest category of regulated institutions, with only about 40% being covered by a formal regulatory framework (figure 6.2).

Size-wise, the ratio of regulated to unregulated are as one might intuitively expect, given the large portion of regulated commercial banks, with the largest institutions (institutions with assets above $25M) having the highest percentage of regulated MFIs, at almost 90% (figure 6.3).

Figure 6.3: % Regulation by Size
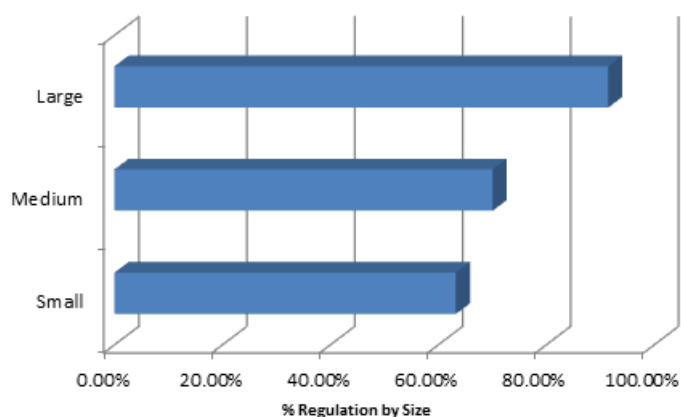
Conversely, the smallest portions (institutions with assets under $1M) of regulated institutions are found amongst the smallest institutions asset-wise, with only about 60% of these answering to a formal regulatory framework.

Finally, the distribution of male and female clients confirms the findings of previous literature, with the majority of clients in small, unregulated MFIs being female, while the ratio between the genders is close to equal in larger, more formalised and regulated institutions[98].

Figure 6.4: % Regulation by Gender

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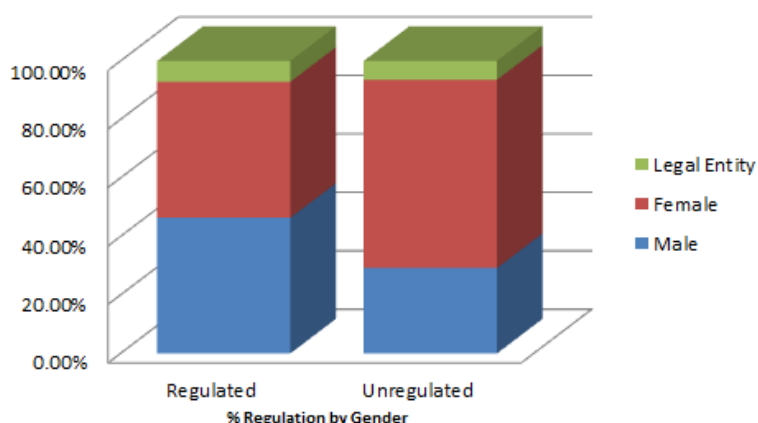
[98] For literature further discussing the gender distribution in microfinance, see Agier and Szarfarz, 2013; Hartarska and Mersland, 2012; Lauretti, 2016; Mersland and Strøm, 2010; Mayoux, 2010,.

Finding a similar change in distribution, some research suggests the existence of a 'glass ceiling' for women in microfinance, where female clients markedly dominate the small, informal lending, but seem to disappear in favour of more male clients, once the loans grow to a certain size (Agier and Szafarz, 2013).

6.5.2. Cross-Country Estimations

Across all 4 measurements for liquidity creation, the correlation between the individual MFI's regulatory status and ability to produce liquidity for the surrounding market is consistently positive and highly significant at 1%. In addition to this, capital stringency appears to be positively and significantly correlated with scaled liquidity creation.[99]

These results are in line with the findings in my previous chapters, but contradict the literature which suggests that the presence of a regulatory framework reduces the performance of microfinance intermediaries (e.g. Hartarska and Nadolnyak, 2007). Instead, my findings lend empirical support to the suggestion that prudent regulatory frameworks and sensible capital requirements may reduce the perceived risk associated with microfinancial lending in volatile and uncertain financial markets (e.g. Thakor, 2013; Theodore and Loubiere, 2002).

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[99] Though I here use fixed effects estimations to account for unobserved geographical effects over time, some literature argues that a GLS model with robust clustered standard errors is more appropriate (e.g. Hartarska and Nadolnyak, 2007). Running same regressions as random effects models return qualitatively same results, though generally with slightly higher significance.

Table 6.4: Liquidity Creation and Regulation, Cross-Country

	LC (log)	LC/GTA	LC/E	LC/GLP
Regulatory status	0.146***	0.032***	0.309***	0.053***
	(0.06)	(0.01)	(0.12)	(0.02)
Capital	-1.513***	-0.381***	-5.675***	-0.572***
	(0.19)	(0.03)	(0.32)	(0.05)
Size	0.941***	-0.011***	-0.017	-0.007
	(0.01)	(0.00)	(0.03)	(0.01)
Bank risk	-0.816***	-0.003	0.496	-0.228**
	(0.29)	(0.05)	(0.52)	(0.11)
Capital stringency	-0.024*	0.007**	0.065**	0.009*
	(0.01)	(0.00)	(0.03)	(0.00)
Age	-0.004*	-0.001	-0.011**	0.000
	(0.00)	(0.00)	(0.00)	(0.00)
Age2	-0.022	-0.003	-0.138	-0.037*
	(0.06)	(0.01)	(0.13)	(0.02)
Inflation	-0.005*	-0.001**	-0.010**	-0.000
	(0.00)	(0.00)	(0.00)	(0.00)
GDP Growth	0.016**	-0.001	-0.005	0.000
	(0.01)	(0.00)	(0.01)	(0.00)
HDI	-4.140	1.601*	-8.962	1.611
	(4.10)	(0.85)	(8.45)	(1.27)
Constant	3.008	-0.372	8.938*	-0.328
	(2.39)	(0.49)	(4.93)	(0.74)
R-sqr	0.882	0.330	0.474	0.340
Adj R-sqr	0.877	0.300	0.451	0.311
Probability F > 0	0.000	0.000	0.000	0.000
Dfres	628	628	628	628
BIC	3695.2	-2309.1	6197.1	-602.9
Root MSE	0.639	0.129	1.246	0.203
Observations	1875	1875	1875	1875

Stars *, ** and *** indicate statistical significance at 10, 5 and 1%, respectively. Country-level fixed effects estimations with clustering at firm level. Robust standard errors are reported in brackets. LC is pure values of liquidity creation, deflated using the Consumer Price Index (CPI). LC/GTA is LC scaled by total assets. LC/E is LC divided by equity. LC/GLP is LC divided by gross loan portfolio. Capital is measured as equity ratio, size and age are logs of assets and years since establishment, age2 is age squared. Bank risk the portfolio at risk for 30 days (PAR30). Regulation status is a dummy, indicating whether the MFI is formally regulated,. Capital stringency is an index indicating the stringency of a country's capital policies.. Finally, GDP growth per capita is GDP growth per capita, Inflation is the % change in the GDP deflator, and HDI is the UN's Human Development Index.

The results remain qualitatively the same (positive and usually significant) across the 3 regions included in this study, though state-level capital stringency requirements appear to be more important than regulatory status in EAP.[100]

The results further lend support to the suggestion that microfinance intermediaries transforming from informal entities into formally regulated institutions do not have to do so at the expense of outreach and the level of capital extended. Rather, a formalized regulatory framework can help reduce the perceived risk associated with reaching the poorest segments of the potential client base, thereby increasing the levels of liquidity created for the market. It should be noted, however, that being transformed into a formally regulated institution is not necessarily the same as commercialization, and as the findings in chapter 4 demonstrated, for-profit status does *not* appear to be correlated with higher levels of liquidity creation.

6.5.3. Capital Requirements and Risk

In line with the estimation results for deposit insurance in chapter 4, the presence of state-level capital requirements (capital stringency in estimations) appears to have a positive relationship with all 4 measurements of LC, though the level of significance varies across regions. This contradicts the concern expressed by some literature, that formal capital requirements will severely hinder the lending activity of financial intermediaries, at least in contexts where the external market volatility is a greater concern than prudent capital regulation.[101]

The findings suggest that it is neither the presence of deposit insurance nor formal capital requirements, which cause a negative relationship between capital and liquidity creation in

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[100] Results are similarly positive and significant for EECA and SA, but these have not been included due to the small (below 100) number of usable observations available, rendering the results unreliable. Results can be found in appendices B and C. MENA could not be run at all.

[101] The impact is particularly clear in East Asia, where the presence of capital stringency appears to crowd out the effect of regulatory status in 3 of the 4 measurements for LC. The region, which greatly varies in terms of macroeconomic growth and stability, is not one of the regions included in this study, but the estimation results can be found in Appendix C, and warrants further study.

MFIs, but rather the tendency in microfinance for institutions to generally hold on to larger sums of capital, to ensure ability to absorb unexpected shock.

The MFIs do not hold on to the capital because they are required to by regulatory legislation, but because it is the safest way to ensure against short-term financial instability. In line with previous findings and those detailed in previous literature from traditional intermediaries, the relationship between capital and liquidity creation is consistently negative and significant. This intuitively makes sense – the more capital the intermediary withholds from the market, the less liquidity will be created.

However, across all estimations and LC measurements, the level of bank risk, expressed as the ratio of the loan portfolio at risk for 30 days (PAR30), is consistently negative, though inconsistent in significance. Based on this, I find no evidence of a relationship between undue institutional risk-taking, and increased liquidity creation. Rather, the results suggest that if anything, undue risk taking reduces liquidity creation long-term.

6.5.4. Size and Age

In both cross-country and regional estimations, the MFI's size is consistently and positively correlated with pure, deflated values of liquidity, and negatively correlated with scaled LC. Intuitively, a positive relationship between pure values of LC and size, which is measured as a log of MFI assets, should not surprise; the more assets the intermediary holds, the more loans can typically be distributed.[102]

The consistent negative relationship between scaled LC and size, however, suggests that unit for unit, smaller institutions are better liquidity creators in microfinance than larger intermediaries. There are likely a number of reasons for this, and no doubt the prevalent usage of joint lending in smaller intermediaries (found to be a consistent and highly significant driver of liquidity creation in chapter 5, has an impact. However, as could also be seen in chapter 5, the negative correlation between scaled LC and size exists on its own as

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[102] A similar, though less significant relationship is observed if the log of assets is replaced with number of active borrowers.

well. This is possibly due to highly localised but more specialised knowledge of community conditions than what a larger intermediary may be able to cultivate.

In terms of the age of the individual intermediary, there is only weak and inconsistent evidence of any correlation with the used LC measurements. The relationship appears to be consistently negative. If the life-cycle theory, which states that non-profit MFIs tend to commercialize as they mature is accurate, then the negative relationship further rejects the suggestion that commercialisation of microfinance institutions necessarily leads to improved performance and outreach.

6.5.5. The Macro Environment

The effect of inflation is consistently negative for scaled levels of liquidity creation, though levels of significance vary greatly across regions.[103] GDP growth is generally not significant in the specified relationship between regulation and liquidity creation. However, a similar region-specific pattern of inflation is observed for HDI, where the socio-economic development levels appear significant and positive in some regions, while negative or insignificant in others. Further discussion of both can be found in the following section, discussing region-specific results.

6.5.6. Regional Results

While the key findings of this study are consistent across regions, there are nonetheless a number of relevant differences revealed in estimations run at regional level for Sub-Saharan Africa, East Asia and Latin America. The included estimation results are found with data pool sizes ranging from 340 to 654 observations.

Regional Inflation

In Sub-Saharan Africa, the primary results directly reflect the cross-country findings, with identical correlation and significance levels for regulatory status, capital and size. However, in addition to these, the two macroeconomic variables, inflation and HDI, also appear to significantly impact the level of liquidity created in this region (Table 6.5)

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[103] Non-ratio LC values were deflated using the Consumer Price Index (CPI).

The nature of headline inflation remains significantly more volatile in SSA than most other regions worldwide, due to an unstable agricultural sector and high share of food in the CPI (Nguyen et al., 2015). In some previous research, a positive relationship has been found between measures of MFI performance and inflation (e.g. Hartarska and Nadolnyak, 2007; Demigur-Kunt and Huizinga, 1999). However, especially in Sub-Saharan Africa, the estimations in this study suggest a consistent negative relationship between liquidity creation and inflation in Sub-Saharan Africa, highly significant at 1% for LC scaled by size and equity.

These results are in line with more recent results from the IMF, which suggested that the main drivers of inflation in the region have started to change, from primarily domestic supply shocks, to weather shocks, the economic importance of agriculture, as well as the lack of prudent trade, monetary policy and regulatory frameworks (Nguyen et al., 2015). The study argues that the previous prevalence of supply-side shocks as the primary driver of inflation reduced the importance of the imposition of monetary policies in the past, but that with the change in primary determinants in recent years, the impact of 'coherent and forward-looking' monetary policies increase, as these can be used to reduce fluctuations in aggregate demand (Nguyen, 2015).

A stable and enabling macro- and meso- environment thus helps reduce the perceived risk associated with microfinancial lending, and with it, increase the MFI production of liquidity for the market. This is further supported by the positive relationship observed between LC and the regional levels of human development (as measured by the UNDP's Human Development Index) described below. In the remaining regions Latin America and South Asia, inflation is insignificant in relation to liquidity creation (tables 6.6 and 6.7).[104] This may be because rates of inflation are lower and institutional frameworks are more comprehensive, so any negative impact may have been drowned out by the effects of other factors.

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[104] A similar relationship is found in EAP, where inflation is insignificant for pure numbers of LC, but highly correlated with all 3 measures of scaled LC. The results could benefit from additional study, once sufficient data can be collected. The level of inflation and general economic growth varies greatly in the region; 2017 levels of inflation in Mongolia are, for example, almost 3 times the level of Taiwan (Asian Development Bank, 2017). See appendix C for estimation results from the region.

Table 6.5: Regulation in Sub-Saharan Africa

	LC (log)	LC/GTA	LC/E	LC/GLP
Regulatory status	0.410***	0.082***	0.490***	0.119***
	(0.14)	(0.03)	(0.24)	(0.04)
Capital	-1.553***	-0.370***	-4.666***	-0.589***
	(0.29)	(0.06)	(0.61)	(0.09)
Size	0.931***	-0.007	-0.001	0.008
	(0.04)	(0.01)	(0.08)	(0.01)
Bank risk	-0.605	0.068	2.236*	0.552*
	(0.44)	(0.08)	(1.26)	(0.24)
Capital stringency	0.025	0.002	-0.025	0.002
	(0.03)	(0.01)	(0.05)	(0.01)
Age	-0.010	0.002	0.017	0.004
	(0.01)	(0.00)	(0.01)	(0.00)
Age2	-0.012	-0.005	-0.236	-0.132**
	(0.17)	(0.04)	(0.38)	(0.06)
Inflation	-0.006**	-0.002***	-0.014***	-0.001
	(0.00)	(0.00)	(0.01)	(0.00)
GDP Growth	0.039**	0.003	-0.012	0.004
	(0.02)	(0.00)	(0.03)	(0.01)
HDI	2.229***	0.386**	2.498*	0.710**
	(0.75)	(0.17)	(1.48)	(0.27)
Constant	-1.075*	0.348***	2.188	0.074
	(0.62)	(0.15)	(1.37)	(0.25)
R-sqr	0.856	0.268	0.423	0.356
Adj R-sqr	0.850	0.237	0.399	0.329
Probability F > 0	0.000	0.000	0.000	0.000
Dfres	171	171	171	171
BIC	1032.6	-266.7	1548.6	138.0
Root MSE	0.741	0.158	1.367	0.256
Observations	421	421	421	421

Stars *, ** and *** indicate statistical significance at 10, 5 and 1%, respectively. Country-level fixed effects estimations with clustering at firm level. Robust standard errors are reported in brackets. LC is pure values of liquidity creation, deflated using the Consumer Price Index (CPI). LC/GTA is LC scaled by total assets. LC/E is LC divided by equity. LC/GLP is LC divided by gross loan portfolio. Capital is measured as equity ratio, size and age are logs of assets and years since establishment, age2 is age squared. Bank risk the portfolio at risk for 30 days (PAR30). Regulation status is a dummy, indicating whether the MFI is formally regulated,. Capital stringency is an index indicating the stringency of a country's capital policies.. Finally, GDP growth per capita is GDP growth per capita, Inflation is the % change in the GDP deflator, and HDI is the UN's Human Development Index.

Table 6.6: Regulation in Latin America and the Caribbean

	LC (log)	LC/GTA	LC/E	LC/GLP
Regulated	0.234**	0.039**	0.498***	0.032
	(0.10)	(0.02)	(0.16)	(0.02)
Capital	-1.571***	-0.287***	-4.362***	-0.415**
	(0.29)	(0.05)	(0.51)	(0.07)
Size	0.942***	-0.011**	-0.010	-0.016**
	(0.02)	(0.01)	(0.05)	(0.01)
Age	-0.003	-0.001*	-0.020***	-0.001
	(0.00)	(0.00)	(0.00)	(0.00)
Age2	-0.040	-0.12	-0.113	-0.039
	(0.10)	(0.02)	(0.16)	(0.03)
Bank risk	-1.174	0.092	1.782*	0.518
	(0.83)	(0.13)	(1.01)	(0.32)
Capital stringency	0.018	0.008***	0.046	0.004
	(0.01)	(0.00)	(0.03)	(0.00)
Inflation	0.005	0.000	0.006	0.003
	(0.01)	(0.00)	(0.02)	(0.00)
GDP Growth	0.005	-0.002	-0.007	-0.004
	(0.01)	(0.00)	(0.03)	(0.00)
HDI	0.233	0.296**	1.497	0.434
	(0.93)	(0.12)	(1.36)	(0.36)
Constant	-0.082	-2.713	-4.254	-3.825
	(0.54)	(1.83)	(3.42)	(2.61)
R-sqr	0.906	0.300	0.504	0.266
Adjusted R-sqr	0.903	0.267	0.481	0.230
Probability F > 0	0.00	0.00	0.00	0.00
Dfres	169	169	169	169
BIC	1187.0	-872.6	1854.3	-419.4
Root MSE	0.558	0.122	0.941	0.165
Observations	654	654	654	654

Stars *, ** and *** indicate statistical significance at 10, 5 and 1%, respectively. Country-level fixed effects estimations with clustering at firm level. Robust standard errors are reported in brackets. LC is pure values of liquidity creation, deflated using the Consumer Price Index (CPI). LC/GTA is LC scaled by total assets. LC/E is LC divided by equity. LC/GLP is LC divided by gross loan portfolio. Capital is measured as equity ratio, size and age are logs of assets and years since establishment, age2 is age squared. Bank risk the portfolio at risk for 30 days (PAR30). Regulation status is a dummy, indicating whether the MFI is formally regulated,. Capital stringency is an index indicating the stringency of a country's capital policies.. Finally, GDP growth per capita is GDP growth per capita, Inflation is the % change in the GDP deflator, and HDI is the UN's Human Development Index.

Table 6.7: Liquidity Creation and Regulation in South Asia

	LC (log)	LC/GTA	LC/E	LC/GLP
Regulatory status	0.212*	0.040*	0.071	0.044*
	(0.11)	(0.02)	(0.32)	(0.03)
Capital	-0.998***	-0.336***	-7.759***	-0.383***
	(0.36)	(0.05)	(0.75)	(0.07)
Size	0.900***	-0.024***	0.180**	-0.011
	(0.03)	(0.01)	(0.08)	(0.01)
Bank risk	-1.279	0.030	-0.363	-0.023
	(0.87)	(0.11)	(0.91)	(0.13)
Capital stringency	-0.038	-0.007	-0.045	-0.006
	(0.03)	(0.00)	(0.06)	(0.01)
Age	-0.007	0.000	0.005	-0.001
	(0.01)	(0.00)	(0.01)	(0.00)
Age2	0.000	-0.015	-0.141	0.024
	(0.15)	(0.03)	(0.36)	(0.04)
Inflation	-0.007	-0.001	0.006	0.002
	(0.01)	(0.00)	(0.02)	(0.00)
GDP Growth	0.026	-0.003	-0.067	-0.015*
	(0.03)	(0.00)	(0.06)	(0.01)
HDI	-1.117	0.027	-2.079	0.007
	(0.79)	(0.19)	(1.90)	(0.24)
Constant	2.412***	-2.599	10.811***	0.870***
	(0.73)	(1.93)	(1.62)	(0.22)
R-sqr	0.807	0.281	0.434	0.232
Adj R-sqr	0.797	0.244	0.404	0.191
Probability F > 0	0.000	0.000	0.000	0.000
Dfres	132	132	132	132
BIC	776.2	-404.7	1383.8	-167.0
Root MSE	0.658	0.118	1.631	0.167
Observations	340	340	340	340

Stars *, ** and *** indicate statistical significance at 10, 5 and 1%, respectively. Country-level fixed effects estimations with clustering at firm level. Robust standard errors are reported in brackets. LC is pure values of liquidity creation, deflated using the Consumer Price Index (CPI). LC/GTA is LC scaled by total assets. LC/E is LC divided by equity. LC/GLP is LC divided by gross loan portfolio. Capital is measured as equity ratio, size and age are logs of assets and years since establishment, age2 is age squared. Bank risk the portfolio at risk for 30 days (PAR30). Regulation status is a dummy, indicating whether the MFI is formally regulated,. Capital stringency is an index indicating the stringency of a country's capital policies.. Finally, GDP growth per capita is GDP growth per capita, Inflation is the % change in the GDP deflator, and HDI is the UN's Human Development Index.

The Human Development Index

The HDI attempts to measure the degree of human development, through a composite index focusing on a trio of health, education and income indicators. In the estimation results from Sub-Saharan Africa, the relationship with LC is highly significant and positive, while positive but only weakly significant in the other two regions. The relationship observed suggests that the socio-economic framework within which MFIs operate is likely to positively impact the MFI's ability to create liquidity, especially in areas with unstable financial markets. For example, if institutions at a very basic level can expect basic mathematical and financial understanding at client-level, the intensity of the required monitoring may be reduced, or change format.

6.6. Conclusion

The relationship between regulation and liquidity creation in microfinance reaches well beyond the traditional borders of development research and deep into long-standing debates about the advantages and disadvantages of state involvement in micro-level activities. The most recent global financial crisis of 2008 highlighted this, and resulted in a call from some for increased financial stability and social effectiveness (Thakor, 2013). However, other voices have warned against increasing the level of state intervention in market mechanisms. They argue that the inevitable distortion of economic activity will have unintended and adverse consequences at the micro-level, such as raising monitoring and administrative costs so much that possible new players in the market are barred from entry (Hartarska and Mersland, 2013).

Because they today play such an instrumental role in most emerging markets across the globe, it is a precondition for prudent regulatory and supervisory policymaking, that we understand the relationship between the regulatory framework, the institutional environment and the ability of MFIs to perform as intermediaries and liquidity creators for the poor. It is especially important because regulation and state intervention are politically sensitive, and therefore hijacked in the general debate about whether to support one political perspective or another.

The results of this study are quite clear; there exists a highly significant and positive relationship between formal regulation and the levels of liquidity creation, both in real and in unit terms. The lag of the right-hand-side variables further suggests a causal relationship beyond correlation, wherein changes to the regulatory framework and status impacts the level of liquidity produced, rather than the other way around.

The cross-country results are echoed in the regional estimations, where the relationship between regulatory status and all 4 measures of liquidity creation is positive and significant, though with varying strength. The findings are particularly clear in the cross-country results, Sub-Saharan Africa and Latin America.

7. Conclusions

Microfinance institutions often play a significant role to in the economies within which they operate. They provide loans and issue deposits on par with traditional intermediaries. However, they do so in areas where clients previously have had no alternative outside the informal lending market, and thus been vulnerable to usurious lending practices. In reaching the previously unbanked, the MFIs play a key role in reducing the informal financial sector, while increasing client protection and the level of liquidity created in markets typically starving for capital.

7.1. MFIs as Liquidity Creators

How do deposit-taking microfinance institutions perform as liquidity creators for their surrounding markets?[105]

The duality of the MFI's purpose makes it uniquely challenging to study, especially when it comes to institutional performance. The intermediaries seek to fulfil two separate but key objectives: some measure of profitability (or at the very least, self-sustainability), and social outreach. However, the weight of either depends on the individual institution, its structure and its external context. In profit-oriented institutions, it may be appropriate to use return on assets or equity (ROA/ROE), while operational self-sustainability (OSS) and financial self-sustainability (FSS) measurements are more appropriate in non-profit institutions. Here, the sustained longevity of its programs is still important, but the depth of the MFI's outreach is usually the primary objective. However, ultimately both sets of performance indicators are internal to the institution, and say little about whether the intermediary is fulfilling its financial and societal role as capital provider.[106]

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[105] Research question from chapter 4.

[106] The OSS also has its critics, who argue that the measurement is inadequate because it is not adjusted like financial-self-sustainability (FSS) is. The counter-argument is that such adjustments would, in the context of current development data, be little more than guesswork. For a further discussion of this, see Yaron, J. and Manos, R., 2007; Schäfer, K., 2011 and Khan, Z. et al., 2017.

Measuring liquidity creation alongside the traditional performance parameters provides an additional dimension to understanding the contribution of financial intermediaries in microfinance. Rather than directly studying the financial health of the institution, it studies the ease, time and cost transformation of its financial output, relative to its input; the liquidity creation process beyond simple changes in maturity. In microfinance, this is of particular importance, because the loans are typically small, with short maturities relative to traditional lending. The transformation is primarily in the ease and cost of access, in reaching into a market considered too risky by traditional intermediaries, and making new clients out of the previously unbanked.

The determinants of liquidity creation in microfinance are slightly different than in traditional intermediaries operating in more stable financial markets, though there are similarities. Capital is strongly and negatively correlated with liquidity creation, which is consistent with the findings for smaller financial institutions in previous literature. Similarly, scaled LC appears to be negatively correlated with size, which combined with the positive correlation with NGO status in chapter 4, suggests that small, locally embedded institutions produce more liquidity unity for unit, possibly due to their higher understanding of local conditions and stronger social collateral (figure 4.5). They know the needs of their clients and client circles, and their direct link with the local community helps put additional pressure on clients to repay their loans on time, effectively creating insurance against default. While perhaps counter-intuitive to some, the results fall well in line with more recent findings, which suggest that for-profit institutions engaged In microfinance are not necessarily the most profitable or most efficient, and a benevolent non-profit institution is able to deliver at least the same level of welfare (and equal performance) as the competitive market. (e.g. de Quidt et al., 2018; Lützenkirchen, 2012).

7.2. The Impact of Specialisation

What is the impact of specialisation and on levels of liquidity creation?[107]

Taking a closer look at the drivers of liquidity creation, the impact of specialised, locality-specific knowledge and lending methodologies stands out. Institutions that rely on fewer lending schemes create more liquidity for the surrounding market. The high degree of the complexity of both lending itself and the subsequent monitoring and evaluation processes may be part of the reason for this; without collateral, the primary tool against default is making sure that your lending approach is appropriate to the given situation.

Microfinance clients tend to switch to new loan types as they grow, moving from group loans to individual lending once the required loans are of a sufficient size. As MFIs typically want to hold on to their more successful clients, there may be a potential clash in mission statements, if the institution is also concerned with outreach; specialising the lending strategy increases the level of liquidity produced by the individual MFI, but internal interests, especially in commercial institutions, may push the MFI toward holding on to individual lenders, even if these require loans that may be difficult to meet, especially by smaller, capital-constrained institutions, and this may limit the loans available to more marginalised clients.

7.3. The Impact of Joint Lending Methodologies

What is the impact of joint lending strategies on levels of liquidity creation?[108]

Joint methodologies are highly correlated with liquidity creation, across all 4 measurements for LC in estimations, and for both estimation models used to calculate the ratio of joint, group and individual lending approaches. In contrast, individual lending is either negative or

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[107] Research question 5a.

[108] Research question 5b.

insignificant. These findings support the theoretical suggestion that the unique lending approaches employed by MFIs to overcome the lack of collateral serve as a form of risk reduction mechanism for the intermediary. Rather than relying on the usual pressures to ensure repayment, the MFIs engaging in joint lending use social pressure and knowledge of local conditions to ensure repayment. Given the size of loans, this is likely to be more successful in the long run, since the cost of traditional measures to ensure repayment after default, may not be available or financially viable for most MFIs.

The impact of joint lending methodologies as a way for microfinance institutions to lower associated risk is becoming increasingly important. As the push to commercialize microfinance continues, recent studies have pointed to a decline in joint lending methodologies used in microfinance, and a shift towards individual lending (de Quidt, J. et al., 2018). If joint lending schemes are one of the primary drivers of liquidity creation in microfinance, as the results here suggest, their disappearance may have marked impact on the continued ability of microfinance intermediaries to adequately perform as liquidity creators.

7.4. The Impact of Regulatory Status and Risk

What is the impact of regulation on the level of liquidity created by microfinance institutions?[109]

The findings throughout all 3 empirical chapters show that the formal regulation of a microfinance intermediary is strongly correlated with the creation of liquidity, and based on the right-hand-side, lagged results appears to have a regulation-LC causal relationship. This is in line with the 'risk absorption' hypothesis, which states that a prudent regulatory framework can absorb some of the risk which faces financial intermediaries, especially when operating in unstable and scattered financial markets.

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[109] Research question 6.

The presence of a formal regulatory framework allows MFIs to extend more illiquid loans to their borrowers with lower associated 'ease' and higher 'time and cost', and without taking undue risk. As portfolio risk is generally found to be insignificant (and when significant consistently anti-correlated with liquidity creation in the cross-country estimations of all 3 chapters), the increased levels of liquidity creation does not appear to be causing the MFIs to take undue risk, or to withhold effort on behalf of the borrowers. This finding is further supported by the insignificant relationship between deposit insurance and the four measurements for LC.

Any debate involving a discussion of state-level imposition on micro-level market conditions is bound to be contentious and complicated by political agenda, but precisely for this reason, it is important to continue to expand our understanding of the relationship between the external meso- and macro-level environment, and micro-level performance. The results here suggest that in developing and emerging markets, a prudent regulatory framework may serve as a risk-reducing mechanism especially to small intermediaries. However, the results also suggest that there are significant geographical differences, and that continued study of the impact of external regulation and supervision is therefore warranted, especially as access to better financial data in emerging regions become available.

7.5. The Impact of Deposit Insurance, Capital and Capital Stringency

How do deposit insurance, capital and capital stringency impact the level of liquidity created by deposit-taking MFIs?[110]

The strongly anti-correlated relationship between capital and liquidity creation in microfinance institutions supports the findings of previous literature on traditional banking, and suggests that the financial fragility hypothesis, first put forth by Diamond and Dybvig,

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[110] Research questions 4a and 6a,

may have some validity (Diamond an Dybvig, 1983; Berger and Bouwman, 2009; Horvath et al., 2014). According to this hypothesis, reduced financial fragility increases the bank's bargaining power, leading to a reduction in depositor trust (Diamond and Dybvig, 1983; Diamond and Rajan, 2001).

However, this hypothesis is less valid in the light of additional findings in the area of microfinance. If capital was negatively associated with liquidity creation due to the reduction of financial fragility for social and macro-political reasons, I would expect any policy implemented to reduce this same fragility, to also be negative and significant. However, that is not the case for deposit insurance. None of the 4 measurements of liquidity creation are significantly correlated with deposit insurance (chapter 4, table 4.15, section 4.5.2), and where capital stringency is significant, the relationship with liquidity creation is positive (chapter 6, table 6.4, 6.4.2). These findings lend support to previous literature finding a similar positive relationship between other parameters of performance and capital stringency in intermediaries operating in more developed economies (e.g. Beltratti and Stulz, 2009).

In the case of deposit insurance, the guarantee does not appear to limit bank effort significantly, perhaps because of the same intermediary's need to fulfil its social goals successfully, an effect which may help explain why non-commercial institutions also are correlated with higher liquidity creation in microfinance (chapter 4, table 4.15). The higher level of security gained through the deposit insurance means reduced risk for the deposit-taking MFI, but this also enables the same institution to push its social poverty alleviation agenda through an increase rather than decrease in its lending.

Ultimately, the results indicate that the risk-reduction and stability gained through prudent financial policy regimes appear to have greater positive effect on the ability of microfinance institutions to function successfully as liquidity creators for the surrounding market.

7.6. The Impact of the External Environment

How does the external environment and developing market characteristics impact the regulatory framework and liquidity creation?[111]

While the level of liquidity appears to be impacted by a range of industry-specific conditions, as well as the presence of a formal regulatory framework, the results are less clear when it comes to other macro-indicators.

GDP growth is positive and significant at 5% for pure deflated values of LC, but insignificant for scaled liquidity creation (chapter 6, table 6.4). This intuitively makes sense; the richer the economy, the larger the average intermediary, and the more loans being funded. However, unit for unit the larger and wealthier institutions do not create more liquidity than the smaller intermediaries, in fact the opposite appears to be more likely. Curiously, GDP per capita is negatively associated with pure, deflated values of LC and LC scaled by GLP, also significant at 5% (chapter 4, table 4.15). This could be due to upward GDP movement either not being reflected in the poorest segments of society, or it could indicate a general client move out of poverty, away from microfinance and toward more traditional bank services.

Overall however, the results are not consistently significant, or even consistently displaying a positive or negative relationship with LC. In development research, GDP Growth and GDP per capita has been under fire for being inadequate in its measure of macroeconomic well-being, primarily due to the great income disparity found in many developing and emerging economies.[112]

To balance GDP data, I have also included the Human Development Index, which measures economic well-being and human development on a broader and more nuanced scale, which also takes education and physical health into account. The relationship between HDI and liquidity creation returned largely positive results for scaled LC, though with varying degrees of significance. The same is the case for inflation, where scaled LC is anti-correlated at 5% in

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[111] Research question 6c.

[112] Estimations were also run with real GDP values, which returned insignificant.

cross-country estimations, but (not surprisingly) displays considerable geographical disparity, where inflation is highly significant in Sub-Saharan Africa, but appears insignificant to all 4 LC measures in Latin America and South Asia. Generally, while some traditional measurements for the state of the macro-environment do seem to influence unit for unit liquidity creation, especially when scaled to unit production, the inconsistency in significance suggests that the primary determinants of liquidity creation are not to be found here.

7.7. Implications for Policymakers and Practitioners

At the very heart of the policy discussion in microfinance is a continued and sometimes contentious debate about the fundamental nature of the industry, and what role it can and should play in and outside development. One side, with Yunus, the Grameen Foundation and other NGOs at the forefront, argue that the primary use of microfinance is and should remain as a development tool for poverty reduction (Yunus, 2003; Carrick-Cagna and Santos, 2009). Anything else carries the very real risk of making MFIs little more than formalized moneylenders, charging usurious interest rates in the name of profit. On the other side, newly commercialised and for-profit institutions argue that if microfinance is to ensure its long-term survival, it is absolutely crucial that intermediaries learn to become financially self-sustainable. Without it, the industry will never move beyond infancy, and will permanently be reliant on notoriously fickle external financing such as contributions from donor agencies. Whatever the conviction, the debate is important, and increased understanding of the interactions between social and financial behaviour more important than ever. We need to fully understand the industry's capacity for traditional financial intermediation as well as its ability to fulfil social goals, in order to understand how to regulate it.

However, formalisation does not necessarily mean increased regulation, and a better regulatory framework does not necessarily imply increased commercialisation of the industry. The results found here suggest that while policymakers in particular should continue to support the development of sector-relevant meso- and macro-level enabling environments, including prudent regulatory frameworks, there is no evidence that

commercialised for-profit institutions create more liquidity for the market. Rather, non-profit status is positively associated with higher levels of liquidity creation. Given the findings of previous literature that for-profit status does not mean better performance in MFIs, it is worth reconsidering whether an aggressive push toward increased commercialisation of the industry is the right course of action, or whether continued institutional development will garner better results in the long run, both when measured by financial and social criteria.

The debate today is moving away from questions of basic financial performance and client-level impact, to more fundamental questions regarding what the core identity of microfinance is, and with it what role microfinancial institutions should play in the general economy. Within this context of an ever-evolving industry, 4 key areas are currently moving to the forefront of the microfinance debate: a) the identity of microfinance, b) the search for efficient lending strategies, c) the macroeconomic impact of microfinance, and d) the increase of the scale and scope of microfinance. These 4 categories are explored further in the following chapter on recent trends in microfinance research.

7.8. Implications for Academia – Future Research

Cross-country liquidity creation in microfinance has not previously been studied, and further attention to the field is warranted moving forward. A better understanding of the financial behaviour of MFIs, and its impact on the stated social goals, is important for both practitioners and policymakers to best help foster future growth and development in the industry. It is my hope that measures for liquidity creation may prove to be useful along with the more traditional financial measurements for performance, and offer much-needed increased insight into the external performance of financial intermediaries in development.

However, on a very fundamental level, the field is still in need of improved financial data. While standards have certainly improved over the years, the amount of audited and verified data, beyond the most basic elements, is still inconsistent and insufficient. As available data grows and becomes consistent, so should academic confidence in the findings of new research. This is especially important for an area such as microfinance, which already is

under extensive political scrutiny and interest, which is unlikely to change anytime soon, especially given the move toward its increased usage in more developed economies.

7.8.1. Liquidity Creation and Social Parameters

The studies in this dissertation have primarily been focused on the financial drivers of liquidity creation. However, in institutions where the social goals are at least as important as financial goals, the question of whether there exists a trade-off between social goals and external performance, as liquidity creator, needs further study. In this context, there is no shortage of questions that still remain unanswered: How do the clients of stronger liquidity creators fare in terms of alleviating long-term poverty? Do institutions which lend primarily to a specified population segment do better or worse than other intermediaries, in terms of LC? What about savings and insurance: do higher liquidity creators perform significantly better or worse in areas beyond microlending?

7.8.2. Expanding the Study of the External Environment

However, despite the primary focus on financial variables in this dissertation, there are still a wide range of relevant financial parameters which deserve further study. This is especially the case with market-level and macroeconomic variables, where a wide range of factors within the external environment could plausibly have impact on levels of liquidity creation by MFIs.

One of these areas is the central bank, and the degree to which the financial institutions involved in microfinance are able to draw from the central bank, and if so how much and with what reference rate. The impact of these macroeconomic variables are particularly important to consider, if a deeper look at the regulatory and supervisory framework surrounding liquidity creation in microfinance is to be studied.

In addition to this, the strength of the legislative framework guiding the individual microfinancial markets is also highly plausible to have impact on the ability of MFIs to function as liquidity creators. Currently, the amount of studies examining the legislative context of microfinance is somewhat sparse, in large part due to difficulty in getting

adequate and useable data. However, given that the legislative framework is a primary guide to how MFIs are regulated, and what policies are implemented; it is an area that deserves much further scrutiny.

7.8.3. Regional Liquidity Creation

In addition to these, there are both regional and market issues that deserve a closer look. The impact of formal capital requirements in East Asia deserves a second look, as does the curious disappearance of rural banks across regions post-2008. In terms of inter-market conditions, the effects of increased competition and clustering are also areas that may well impact the external performance of MFIs as liquidity creators. Finally, from a cross-cultural perspective, the structural and organisational differences evident cross-country deserves a second look, especially once the dataset becomes large enough to do country-level comparisons of institutional types and cultural settings.

All of the areas listed above will contribute significantly to our understanding of the social and financial behaviour of microfinance institutions, and ultimately help illuminate the conditions under which MFIs may best contribute to the continued alleviation of poverty and capital constraints in their individual markets.

8.   References

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Appendix A: Liquidity Classification of Bank Activities

Assets					
Illiquid Assets (weight = 1/2)		Semiliquid Assets (weight = 0)		Liquid Assets (weight = -1/2)	
(cat)	(mat)	(cat)	(mat)		
Commercial real estate loans (CRE)	All loans and leases with a remaining maturity > 1 year	Residential real estate loans (RRE)	All loans and leases with a remaining maturity ≤ 1 year	Cash and due from other institutions	
Loans to finance agricultural production		Consumer loans		All securities (regardless of maturity)	
Commercial and industrial loans (C&I)		Loans to depository institutions		Trading assets	
Other loans and lease financing receivables		Loans to state and local governments		Fed funds sold	
Other real estate owned (OREO)		Loans to foreign governments			
Customers' liability on bankers acceptances					
Investment in unconsolidated subsidiaries					
Intangible assets					
Premises					
Other assets					

Liabilities plus Equity		
Liquid Liabilities (weight = 1/2)	Semiliquid Liabilities (weight = 0)	Illiquid Liabilities (weight = -1/2)
Transactions deposits	Time deposits	Bank's liability on bankers acceptance
Savings deposits	Other borrowed money	Subordinated debt
Overnight federal funds purchased		Other liabilities
Trading liabilities		Equity

Off-balance Sheet Guarantees (notional values)		
Illiquid Guarantees (weight = 1/2)	Semiliquid Guarantees (weight = 0)	Liquid Guarantees (weight = -1/2)
Unused commitments	Net credit derivatives	Net participations acquired
Net standby letters of credit	Net securities lent	
Commercial and similar letters of credit		
All other off-balance sheet liabilities		

Off-balance Sheet Derivatives (gross fair values)		
		Liquid Derivatives (weight = -1/2)
		Interest rate derivatives
		Foreign exchange derivatives
		Equity and commodity derivatives

Source: Berger and Bouwman 2009: 3791

Appendix B: Regulation and LC

2004 - 2012	Number of Observations	Mean	Standard Deviation	Minimum	5th Percentile	Median	95th Percentile	Maximum
Dependent Variables:								
Liquidity Creation (Deflated)	3672	14.45 M	30.75 M	0.00 M	0.08 M	2.62 M	78.76 M	293.22 M
Liquidity Creation / Gross Total Assets	3672	0.33	0.16	0.00	0.06	0.32	0.61	1.81
Liquidity Creation /Gross Loan Portfolio	3672	0.48	0.53	0.00	0.10	0.44	0.93	21.85
Liquidity Creation / Equity	3672	2.10	1.79	0.00	0.15	1.65	5.84	9.95
Regulation Specifics:								
External Audit	1545	2.94	0.90	0.00	2.00	3.00	4.00	5.00
Deposit Insurance	3028	0.32	0.46	0.00	0.00	0.00	1.00	1.00
Capital Stringency	3227	0.58	0.11	0.28	0.37	0.59	0.73	0.83
Restriction Index	3059	8.02	2.01	3.00	5.00	8.00	12.00	12.00
Supervisory Power	3179	11.34	2.25	1.00	7.00	11.00	15.00	16.00
Transparency	3209	4.89	0.97	2.00	3.00	5.00	6.00	6.00
Governance	1550	15.23	1.60	9.00	12.00	15.00	17.00	18.00

Notes
Exclusions: Faulty data; Diamond ratings 0-2; Non-Deposit takers; Negative Equity; Years 1999-2003

Appendix C: Liquidity Creation and Regulation in East Asia and Pacific

	LC (log)	LC/GTA	LC/E	LC/GLP
Regulatory status	-0.087	0.013	0.285	0.084**
	(0.10)	(0.02)	(0.18)	(0.03)
Capital	-2.443***	-0.524***	-6.188***	-0.671***
	(0.38)	(0.06)	(0.71)	(0.12)
Size	0.959***	-0.007	0.025	0.008
	(0.04)	(0.01)	(0.06)	(0.01)
Bank risk	-0.907***	-0.086	-0.429	-0.101
	(0.30)	(0.07)	(0.80)	(0.10)
Capital stringency	-0.079	0.202***	2.139***	0.370***
	(0.32)	(0.06)	(0.65)	(0.09)
Age	0.925*	0.208*	0.625	0.278*
	(0.50)	(0.12)	(0.68)	(0.16)
Age2	-1.403*	-0.308*	-1.295	-0.412*
	(0.74)	(0.18)	(1.07)	(0.25)
Inflation	-0.061	-0.024***	-0.166***	-0.035***
	(0.04)	(0.01)	(0.05)	(0.01)
GDP Growth	-0.042	-0.019**	-0.074	-0.026**
	(0.04)	(0.01)	(0.07)	(0.01)
HDI	37.856*	-6.756*	-92.850**	-12.004**
	(22.60)	(4.05)	(42.82)	(5.60)
Constant	-22.967*	3.918*	52.121**	6.392*
	(13.12)	(2.36)	(24.21)	(3.27)
R-sqr	0.878	0.440	0.493	0.411
Adj R-sqr	0.870	0.405	0.461	0.374
Probability F > 0	0.000	0.000	0.000	0.000
Dfres	125	125	125	125
BIC	719.1	-450.6	1244.7	-10.5
Root MSE	0.563	0.119	1.130	0.214
Observations	377	377	377	377

Stars indicate statistical significance at 10, 5 and 1%, respectively. Standard errors are in parenthesis.

Appendix D: Liquidity Creation and Regulation in Eastern Europe and Central Asia

	LC (log)	LC/GTA	LC/E	LC/GLP
Regulatory status	0.514**	0.093**	0.654**	-0.074
	(0.19)	(0.04)	(0.27)	(0.09)
Capital	0.784	-0.050	-3.292***	0.042
	(1.14)	(0.17)	(1.03)	(0.23)
Size	0.712***	-0.018	-0.039	0.046
	(0.18)	(0.03)	(0.19)	(0.04)
Bank risk	0.491	0.240	0.647	0.395
	(2.89)	(0.46)	(3.35)	(0.67)
Capital stringency	-0.086	-0.010	0.018	-0.005
	(0.15)	(0.01)	(0.11)	(0.02)
Age	0.599	0.034	0.156	0.040
	(0.42)	(0.06)	(0.47)	(0.09)
Inflation	-0.015	-0.002	-0.018	-0.001
	(0.02)	(0.00)	(0.03)	(0.00)
GDP Growth	-0.012	-0.003	-0.017	0.001
	(0.04)	(0.00)	(0.04)	(0.01)
HDI	-66.757	-7.712	-107.745**	-17.446*
	(48.05)	(5.14)	(50.43)	(9.70)
Constant	47.603	5.889	74.844**	11.226*
	(32.76)	(3.52)	(34.66)	(6.39)
R-sqr	0.878	0.525	0.745	0.455
Adj R-sqr	0.814	0.274	0.610	0.168
Probability F > 0	0.000	0.000	0.000	0.000
Dfres	26	26	26	26
BIC	230.1	-88.0	261.0	-5.5
Root MSE	0.775	0.112	0.936	0.184
Observations	82	82	82	82

Stars indicate statistical significance at 10, 5 and 1%, respectively. Standard errors are in parenthesis.

Appendix E: Correlation Matrices

Chapter 4 – Correlation matrix – Liquidity Creation, Capital and Deposit Insurance

	Capital	Size	Regulated	Profit Status	Risk	Operational Self-Sufficiency	Deposit Insurance	Age	Inflation	GDP Growth	HDI
Capital	1.0000										
Size	-0.3361	1.0000									
Regulated	-0.1810	0.2649	1.0000								
Profit Status	-0.0988	0.1763	0.3329	1.0000							
Risk	-0.0450	-0.1078	0.0242	0.0359	1.0000						
Operational Self-Sufficiency	-0.0203	0.1140	0.0477	0.0071	-0.0959	1.0000					
Deposit Insurance	0.0905	-0.0613	0.1764	-0.1105	-0.0541	-0.0316	1.0000				
Age	-0.1634	0.1809	0.1192	-0.0768	0.0587	0.1016	-0.1167	1.0000			
Inflation	0.0361	-0.1269	0.0178	0.1085	0.0785	-0.0058	0.1283	-0.1297	1.0000		
GDP Growth	0.0245	-0.0277	0.0390	0.0916	-0.0930	0.1353	0.0166	0.0128	0.0577	1.0000	
HDI	-0.1851	0.2226	-0.0180	0.0151	-0.0053	0.0403	-0.3170	0.1498	-0.1604	-0.1117	1.0000

Chapter 5 – Correlation Matrix – Liquidity Creation and Specialisation

	HHI	Capital	Size	Age	Risk	Operational Self-Sufficiency	Profit Status	Regulated
HHI	1.0000							
Capital	-0.1570	1.0000						
Size	-0.1026	-0.3446	1.0000					
Age	0.0423	-0.1341	0.2364	1.0000				
Risk	0.0009	-0.0362	-0.0562	0.0683	1.0000			
Operational Self-Sufficiency	0.0145	0.0610	0.0190	0.0878	-0.0792	1.0000		
Profit Status	-0.1874	-0.0726	0.2935	-0.1251	-0.0085	-0.0033	1.0000	
Regulated	-0.0557	-0.1864	0.2646	0.0639	-0.0105	-0.0568	0.2953	1.0000

Chapter 5 – Correlation Matrices – Liquidity Creation and Lending Methodologies

Joint lending – model 1

	Joint Lending (Ratio)	Capital	Size	Age	Risk	Operational Self-Sufficiency	Profit Status	Regulated
Joint Lending (Ratio)	1.0000							
Capital	0.0839	1.0000						
Size	-0.2891	-0.3667	1.0000					
Age	-0.1663	-0.1827	0.3059	1.0000				
Risk	-0.1008	0.0039	-0.0444	0.0419	1.0000			
Operational Self-Sufficiency	0.0263	0.0713	0.0378	0.0761	-0.1262	1.0000		
Profit Status	-0.2479	-0.0944	0.3010	-0.0636	-0.0701	0.0099	1.0000	
Regulated	-0.2947	-0.1621	0.2398	0.0721	-0.0533	-0.0539	0.3621	1.0000

Group Lending – model 1

	Group Lending (Ratio)	Capital	Size	Age	Risk	Operational Self-Sufficiency	Profit Status	Regulated
Group Lending (Ratio)	1.0000							
Capital	0.0113	1.0000						
Size	-0.2571	-0.3643	1.0000					
Age	-0.1042	-0.1549	0.2993	1.0000				
Risk	-0.0731	-0.0005	-0.0707	0.0706	1.0000			
Operational Self-Sufficiency	0.0085	0.0736	0.0255	0.0813	-0.1545	1.0000		
Profit Status	-0.2704	-0.1104	0.3085	-0.0335	-0.0916	0.0097	1.0000	
Regulated	-0.2393	-0.1868	0.2190	0.0772	-0.0626	-0.0659	0.3301	1.0000

Individual lending – model 1

	Individual Lending (Ratio)	Capital	Size	Age	Risk	Operational Self-Sufficiency	Profit Status	Regulated
Individual Lending (Ratio)	1.0000							
Capital	-0.1378	1.0000						
Size	0.0396	-0.3536	1.0000					
Age	0.0760	-0.1401	0.2332	1.0000				
Risk	0.0630	-0.0421	-0.1066	0.0584	1.0000			
Operational Self-Sufficiency	0.0210	0.0263	0.0375	0.1068	-0.0917	1.0000		
Profit Status	-0.1175	-0.0874	0.2748	-0.1246	-0.0159	-0.0148	1.0000	
Regulated	0.1370	-0.1754	0.2556	0.0614	-0.0248	-0.0573	0.2646	1.0000

Joint lending – model 2

	Joint Lending (Dummy)	Capital	Size	Age	Risk	Operational Self-Sufficiency	Profit Status	Regulated
Joint Lending (Dummy)	1.0000							
Capital	-0.0018	1.0000						
Size	-0.1131	-0.3333	1.0000					
Age	-0.0302	-0.1567	0.2120	1.0000				
Risk	-0.0681	-0.0382	-0.0930	0.0890	1.0000			
Operational Self-Sufficiency	-0.0028	0.0430	0.0049	0.0392	0.1000	1.0000		
Profit Status	-0.1256	-0.1372	0.2532	-0.0681	0.0143	-0.0198	1.0000	
Regulated	-0.0998	-0.1977	0.2607	0.1065	0.0173	-0.0259	0.3280	1.0000

Group lending – model 2

	Group Lending (Dummy)	Capital	Size	Age	Risk	Operational Self-Sufficiency	Profit Status	Regulated
Group Lending (Dummy)	1.0000							
Capital	-0.0134	1.0000						
Size	-0.1092	-0.3333	1.0000					
Age	-0.0349	-0.1567	0.2120	1.0000				
Risk	-0.0621	-0.0382	-0.0930	0.0890	1.0000			
Operational Self-Sufficiency	-0.0008	0.0430	0.0049	0.0392	0.1000	1.0000		
Profit Status	-0.1041	-0.1372	0.2532	-0.0681	0.0143	-0.0198	1.0000	
Regulated	-0.0395	-0.1977	0.2607	0.1065	0.0173	-0.0259	0.3280	1.0000

Individual lending – model 2

	Individual Lending (Dummy)	Capital	Size	Age	Risk	Operational Self-Sufficiency	Profit Status	Regulated
Individual Lending (Dummy)	1.0000							
Capital	-0.1633	1.0000						
Size	0.1472	-0.3333	1.0000					
Age	0.0116	-0.1567	0.2120	1.0000				
Risk	0.0144	-0.0382	-0.0930	0.0890	1.0000			
Operational Self-Sufficiency	-0.0161	0.0430	0.0049	0.0392	0.1000	1.0000		
Profit Status	-0.0400	-0.1372	0.2532	-0.0681	0.0143	-0.0198	1.0000	
Regulated	0.0737	-0.1977	0.2607	0.1065	0.0173	-0.0259	0.3280	1.0000

Chapter 6 – Correlation Matrices: Liquidity Creation and Regulation

Liquidity Creation and Regulation, Cross-Country

	Regulated	Capital	Size	Age	Risk	Capital Stringency	Inflation	GDP Growth	HDI
Regulated	1.0000								
Capital	-0.2000	1.0000							
Size	0.2682	-0.3248	1.0000						
Age	0.1111	-0.1590	0.1957	1.0000					
Risk	0.0401	-0.0449	-0.1016	0.0571	1.0000				
Capital Stringency	-0.0239	-0.1576	-0.0196	0.0101	0.0337	1.0000			
Inflation	0.0161	0.0272	-0.1254	-0.1229	0.0592	0.0275	1.0000		
GDP Growth	-0.0251	0.0326	-0.0306	0.0184	-0.0759	-0.1413	0.1392	1.0000	
HDI	-0.0695	-0.1468	0.2147	0.1471	-0.0159	0.0828	-0.1605	-0.1398	1.0000