Spillovers in Microfinance
The case of Tanzanian smallholder farmers and their community

Abstract:

Through facilitating entrepreneurship, microfinance has become popular as sustainable alternative for development aid. Despite the numerous microfinance project evaluations, knowledge of the effects on non-participating community members is limited. This thesis explores the spillover effects of microfinance projects on the community level. To do this, a Tanzanian project for smallholder farmers is analysed. Panel survey data and qualitative interviews show that the project generates some small spillovers, especially through sharing of knowledge and by increasing community involvement and labour hiring.

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1. Introduction

Reducing poverty is still a world challenge. In 2012, 12.7% of the world population lived in extreme poverty, and around 35% lived under the poverty line of US $3.10 a day (World Bank, 2016a). At the same time, the effectivity of development aid is being questioned and the per capita support for traditional development programs has been decreasing for twenty years (Kharas, 2007). As compensation, financially more sustainable alternatives to reduce poverty have become more popular. One of these expectedly more sustainable poverty reduction methods is microfinance, which is a broad term for all sorts of small loans given out to entrepreneurs who have limited access to a loan of a commercial bank. With these loans from microfinance institutions (MFIs), entrepreneurs have the chance to invest in the productivity of their business. At the end of 2010, the global microfinance market had around 205 million clients (Maes and Reed, 2012), it has been growing greatly with 10 to 25 percent every year since and was expected to grow by 10 to 15 percent in 2016 (ResponsAbility, 2015).

Microfinance often aims to reach social goals, such as poverty reduction, stimulation of economic development and empowerment of certain groups in society. It is, however, not always clear whether these social goals are met through the different microfinance projects. Several studies have been carried out to find out the impact of microfinance with regard to these social goals. From their literature review, Hossain, Hossain and Rezaul (2009) show that most studies find a positive impact of microfinance on poverty reduction and livelihood enhancement of participants. Nonetheless, some studies are critical about the existence of effects, the size of possible improvements, and the ability of microfinance to reach the poorest in the society (Hossain et al., 2009). Depending on who is reached by the MFIs, the projects could affect inequality in either a positive or negative way (Mathew, 2008).

Parallel to the economic growth of the sector, the microfinance section is experiencing a paradigm shift from addressing the need of financial means towards focussing on the demand, incorporating an increasing importance of the ability and willingness of participants to pay interest for the loans (Zeller and Johannsen, 2006). MFI's do reach the poor, but are more likely to have richer and more successful community members as their clients, whom on average lend higher loans than the poorer population (Coleman, 2006; Zeller and Johannsen, 2006). It is argued that targeting the poorest people is less efficient than having somewhat richer participants (Mathew, 2008). Mosley & Hulme (1998) show that the impact of microfinance is positively related to the former income of the household. This means that there is an impact curve in which the MFI has to choose between targeting the poorest or seeing bigger impact from the loans (Mosley & Hulme, 1998). Hermes, Lensink & Meesters (2011) confirm this, finding that the efficiency of a MFI declines if the average loan balance of borrowers is lower, showing a negative relation between efficiency and outreach to the poor. More and more, the focus of microfinance has been shifted from outreach to the poorest in society towards efficiency and financial sustainability of the MFIs (Hermes et al., 2011).

One of the arguments used in favour of targeting borrowers with high impact rather than the poorest is the assumption of indirect effects that spill over from participants to non-participants. This reasoning makes outreach to the poorest less important than the impact achieved by MFIs and the financial sustainability (Zeller and Johannsen, 2006). Several studies (Zohir and Matin, 2004; Zeller and

Johannsen, 2006; Mathew, 2008; Hermes et al., 2011) point towards the possibility of these spillover effects in microfinance. With these spillover effects, non-participants will profit from the growth in productivity and welfare of participants, for example by the creation of employment and extra consumption. In this way, microfinance could indirectly help the non-participants (Zohir and Matin, 2004). Due to spillover effects, the economic impact of the loan becomes more important than reaching the target group, as the implementation might be tangible for not only the microfinance clients, but for others in the local economy as well (Zeller & Johannsen, 2006). Furthermore, it is argued that the impact of microfinance might be underestimated when not taking into account the wider impact (Zohir & Matin, 2004).

Although the term is brought up in multiple studies, there is yet only few evidence about the existence of these possible spillovers from participants to non-participants in microfinance projects (Zohir and Matin, 2004; Mathew, 2008). In a special issue on the wider impact of microfinance, Chowdhury, Mosley & Simanowitz (2004) argue that assessment of the wider impact is key in understanding the role and possibilities of MFI's in fighting poverty. The assessment of this kind of impact is however not often done, as the conventional impact assessments are easier done and of most importance for the microfinance institutions themselves. In the same issue, Zohir & Matin (2004) give some theoretical insights in the possible wider effects of microfinance. However, empirical evidence is still lacking. Most studies in microfinance only make cross-sectional comparison between the participants and non-participants of microfinance. These studies do not take into account changes on the market level and their influence on households (Zohir & Matin, 2004). Hence, current research often fails to study spillovers and inequality effects of microfinance (Matthew, 2008). To get some insight in possible wider and indirect effects of microfinance, this study will focus on how microfinance affects both participating and non-participating households.

The vast majority of the studies on microfinance impact are based on quantitative data. Although the processes behind the impact could be useful in explaining effects and improving microfinance projects, quantitative studies are more likely to find results on the existence and the size of an impact, rather than to explain the occurrence of these effects exist (Longhurst, 2010). According to Kabeer (2001), qualitative research on microfinance impact might give another view than quantitative research. Within the very limited number of qualitative studies on microfinance, the ethnographic research of Banerjee & Jackson (2016) shows that qualitative research could give some new insights in the functioning of microfinance. Because of the explorative nature, this research will use qualitative data in the form of interviews with participants and their community members, besides the conventional cross-sectional survey data.

To explore the spillover effects of microfinance programs, this study will use the case of the Livelihood Enhancement and Agricultural Development (LEAD) project, in which Tanzanian smallholder farmers receive business training and in some cases a loan[1].

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[1] See chapter two for a description of the project.

Goal & research questions

The goal of this thesis is to explore the role of spillovers within the wider economic impact of microfinance projects. The main question of this thesis will be: **How do spillovers affect the impact of microfinance projects for farmers on the community?**

In order to answer this question, three sub questions will be answered:

- What impact does a microfinance project have on the economic wellbeing of participating Tanzanian farmers?
- To what extend is the project impact affected by contact between farmers?
- In which ways is the project tangible for community members who are not involved in the project, regarding the economic wellbeing in the community?

Reading guide

This research focusses on the specific case of the LEAD project in Tanzania, of which the context will be described in chapter 2. Afterwards, chapter 3 presents the existing literature and theory on the impact and especially the spillovers in microfinance projects. Using a combination of microfinance literature and economic geographical theory, the theoretical framework will end in a conceptual model on how microfinance project could spill over to others in the community. The quantitative and qualitative data that is used and the analysis done in order to answer the research questions will be discussed in chapter 4. The results of these analyses are given in chapter 5. Chapter 6 gives a conclusion and discussion of the results.

2. Case project and context

2.1 Project context: Agriculture in Tanzania

Tanzania is a low-income country in Eastern Africa. With a population of 53.47 million persons and a GDP of $44.90 billion, the country had a GDP per capita of $840 (World Bank, 2016b) in 2015, which results in $2580 based on purchasing power parity valuation (African Economic Outlook, 2016). Until 2014, the GDP was growing rapidly with around 7% a year, but in 2015 the GDP declined with the same percentage (see Figure 1). In the household budget survey of 2011, the share of population that lived under the international poverty headcount of $1.90 a day had decreased from 84.7% in 2000 to 46.4% in 2011 (World Bank 2016b). Considering the national poverty line, 28.2% of the population lived below the poverty line, of which the biggest part in rural areas (Emenuga, Dhiliway & Charle, 2016). The GINI-index for inequality was estimated at 37.8% in 2011, meaning that the inequality is around the world medium (World Bank 2016b).
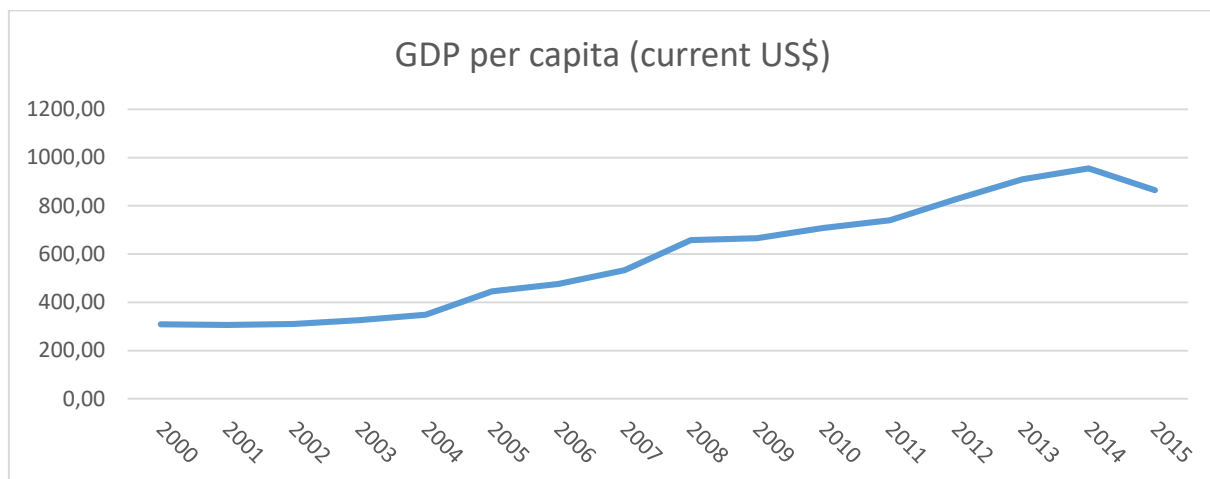
Figure 1. GDP per capita in Tanzania (data source: World Bank, 2016b)

Agriculture accounted for 30,5% of the national GDP in 2015 and employed 66,9% of the labour force (World Bank, 2016b). Tanzanian farmers are mostly smallholder farmers, with on average one to three hectares of land (Sarris et al., 2006). Most of the land is cultivated by hand, but some farmers use ploughs and tractors. According to The United Republic of Tanzania (2016), maize, rice, wheat, sorghum/millet, cassava and beans are the most produced crops. Livestock is only a small part of the agricultural production, and often combined with the production of crops. The majority of the agricultural products of Tanzanian farmers is not sold, but used for own consumption. Two major issues for Tanzanian farmers are the periodical droughts and the application of poor technology. Sarris et al. (2006) argue that increasing agricultural production has a positive effect on the overall rural income.

Tanzania has 30 administrative regions, which have again been divided into 169 smaller districts (The United Republic of Tanzania, 2013). The smallest governmental unit in Tanzania is a village, which is mostly composed of 200 to 1000 households (BRAC Maendeleo Tanzania, 2014). In rural areas, the households consist of on average five persons (The United Republic of Tanzania, 2013).

2.2 Project description

In order to analyse the spillover effects of microfinance and training, this thesis will focus on the specific case of the Livelihood Enhancement through Agricultural Development (LEAD) project in Tanzania. The international NGO Bangladesh Rural Advancement Committee (BRAC) started this project in April 2013 to improve the household income of smallholder maize and poultry farmers by increasing access to knowledge and credit among poor farmers. Figure 2 and 3 give an impression of the average size and outlook of the farms of participants.

The participants of the project were divided into 7.683 different maize or poultry groups within a few kilometres from their house. From within the communities, farmers were selected to lead these groups of ten to fifteen farmers. The farmers got a business training, in which they learned new skills and farming technologies to impart to the farmers group and the leading farmers received some extra training. Afterwards, group meetings were organised frequently by the group leader and project organisation, in which the implementation of the learned methods was discussed and free input was given out to some participants. In addition to that, the groups got access to a group loan from BRAC, creating the opportunity to invest in the productivity of their farm. However, only a small part of the participants (19.1%) has taken out this loan, leading to a total of 2.9 million US dollar of agricultural loans. Lastly, the groups organized collective marketing, in order to get better market access and create some economies of scale.

Besides the group project, BRAC organised demonstration plots, farmers' field days, training for input and output traders, market assessments and workshops on local value chain development. For firms that serve maize and poultry farmers, an investment fund was set up, disbursing 534.875 US dollar to entrepreneurs that improve market access.

Figure 3. Tanzanian maize farm

Figure 3. Tanzanian poultry farm

The direct organisation of the project, such as selecting participants and organising group meetings, is primarily the responsibility of the local branch offices of BRAC. In total, the project is implemented in the areas of 40 different branches divided over 15 of the 30 regions of Tanzania, with a number of farmers that increased from 12.480 at the start in 2014 to a final number of 106.640 in 2016. Figure 4 shows the regions in which the LEAD project runs in both blue and blue with green stripes. It has to be noted that the project is only implemented in certain areas of these survey and project regions.

BRAC (2016) argues that two years after the implementation, farmers had better access to agricultural inputs, were more likely to adopt new technologies, and had greater ability for reaching markets to sell their products. During the project, the farmers became more likely to collectively sell their products, make non-local arrangements and organise official contracts. With these changes, participants were able to significantly increase their yield, income and overall livelihoods (BRAC, 2016).
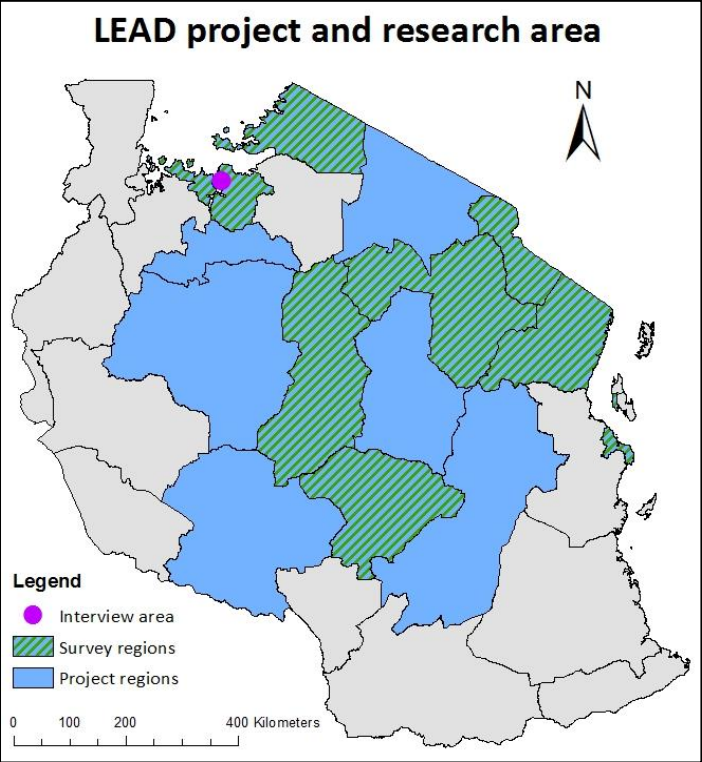

Figure 4. LEAD project areas and research areas

3. Theoretical framework

In this chapter the existing literature and theories on microfinance and spillovers are discussed. First, a review will be given on the aims and direct effects of microfinance, including the effects of loan access as well as the often incorporated training and enhancement of social capital. Afterwards literature and theory on the wider effects of microfinance will be discussed and linked to economic geographical theory. In paragraph 3.3 these theories are merged in a conceptual model that tries to explain in what ways microfinance might have effects on the community level.

3.1 Direct effects of microfinance

There are different opinions on the effectiveness of microfinance in reducing poverty, but overall microfinance is considered as an effective poverty alleviation tool. Microfinance is meant to reduce poverty by giving the poor opportunities for entrepreneurship. The access to microfinance credit allows people to invest in their capital and in that way to increase productivity, human capital, and standards of living (Wolfensohn & Bourguignon, 2004). The literature review of Hossain et al. (2009) shows that microfinance participants increase their income, decrease economic vulnerability, gain more educational opportunities, have greater empowerment, and gain better health by having better health facilities and nutrition. Sometimes, borrowers are able to improve their well-being so greatly that they totally grow out of poverty (Hossain et al., 2009).

Literature review on Grameen Bank, which is the first and one of the biggest microfinance institution, concludes that most studies agree that microfinance from the Grameen Bank has helped reducing poverty (Bhuiyan, Siwar & Talib; 2012). The review argues that the bank has increased income, consumption, and women empowerment while reducing her borrowers' vulnerability.

In a research on projects of the microfinance institution BRAC, Hossain (2012) suggests that the impact of microfinance is positive, but the effect is sometimes limited. The study finds that a microfinance loan significantly enlarges income and contribution to family expenditures. Beneficiaries were able to create better employment opportunities for themselves and others. However, the effects were not significant on other fields such as housing condition, savings, and poverty alleviation.

With a research in Bangladesh, Khandker (2005) shows strong evidence that microfinance programs help the poor to build assets and have a stable consumption throughout the year. Furthermore, microfinance institutions promote investment in human capital, awareness of reproductive health, and women empowerment. At the start of a project, 5% of the borrowers are lifted out of poverty, but the results however diminish after the first program (Khandker, 2005).

According to Banerjee et al. (2015), microfinance does give part of her borrowers the chance to expand business, although the long-term effect appears to be quite moderate, as monthly consumption does not increase. Nevertheless, households do get to invest in more durable goods rather than in temptation goods (Banerjee et al., 2015). It is also shown that receiving a formal credit shifts farmers towards more efficient contractual agreements.

Girabi and Mwakaje (2013) show that farmers in the Tanzanian district Iramba had higher productivity when they had access to microfinance. Reasons for this were the relatively better market access, better selling prices, use of inputs, adoption of improved farming technologies, and the ability to hire labour

and transport. From regression, it was seen that the use of input led to higher agricultural productivity. This is in line with the general consensus among studies carried out in Tanzania that microfinance has a positive impact on poverty alleviation (Garabi & Mwakaje, 2013).

It must be said that there are also some critics about the effectiveness of microfinance. Mosley and Hulme (1996; in Bhuiyan et al., 2012) concluded that microfinance has not been as effective in reducing poverty as expected. Main criticisms are that the poorest people and less developed regions are not reached or that some are even exploited due to the commercial approach within microfinance (Bhuiyan et al., 2012). Banerjee & Jackson (2016) conclude that microfinance projects in rural Bangladesh were even bad for the participants, as part of the participants does not have an entrepreneurial nature and hence used the credit for consumption rather than investment. In the end, this led to increased indebtedness and vulnerability. Zeller and Johannsen (2006) suggest that poverty outreach differs by type of microfinance institution. They find that solidarity group lending or cooperative mechanisms have the best poverty outreach, in which poverty rates reduce if people are clients of MFIs for a longer time. So, the outcome of microfinance projects is not always straightforward.

Training

In their framework on wider impacts of microfinance institutions, Zohir & Matin (2004) argue that microfinance institutions have a wider involvement than giving out loans only. In Bangladesh, all microfinance programs are preceded by the formation of small groups, often MFIs provide social services such as training, and the institutions act as entrepreneurs in the private sector (Zohir & Matin, 2004). This multi-dimensional approach is supported by Hossain et al. (2009), who conclude that although microfinance loans contribute to poverty alleviation, other interventions are needed as well. Hossain et al. (2009) suggest that borrowers' training and monitoring are some main tools in order to achieve proper and effective use of the loans.

Kessy & Temu (2010), who compare microfinance beneficiaries who ever had a business and entrepreneurship training with beneficiaries who never had, find that training can be very important in facilitating the growth of enterprises, as it enhances the owner's skills, business behaviour and the ability to perform. The asset and sales revenue of Tanzanian businesses appear to be higher, and thus firms perform better, when receiving business training additional to the microfinance (Kessy and Temu, 2010). Also for the agricultural sector importance of training is found: Bidasha et al. (2016) show that education and technological assistance are two of the factors that explain the productivity of a farm. Technical support in the form of training and technical assistance will lead to more modernization and efficiency in the agricultural sector (Bidasha et al., 2016).

Social capital

Besides giving access to financial capital in the form of a loan and human capital in the form of training, creation of social capital is also one of the main components of most microfinance projects. As defined in the work of Putnam (1993, p2), the multidimensional concept of social capital includes "features of social organization, such as networks, norms, and trust, that facilitate coordination and cooperation for mutual benefit", and "enhances the benefits of investment in physical and human capital". This social capital can be divided in two different forms: Bonding capital are the strong links within a

network of likeminded people that help people to 'get by', whereas bridging capital is the ability to connect with others in more heterogeneous networks, leading to different information and new insights to 'get ahead' (Woolcock and Narayan, 2000).

Research shows that communities with strong social capital are more capable to deal with poverty and vulnerability (Woolcock and Narayan, 2000). According to Banerjee & Jackson (2016), rural communities in developing countries have often great bonding social capital, making the poor less vulnerable, but they lack bridging capital. Most governments of developing countries create only few opportunities and resources for the poor communities to escape poverty, leaving a gap that could be filled by other institutions (Banerjee & Jackson, 2016). Microfinance projects provide the impoverished with better access to resources and networks, thereby strengthening social capital. Often this is done by creation of community and vertical networks, as well as by enhancing social capital through training.

By studying the economic impact of increased social contact from group lending, Feigenberg, Field & Pande (2010) show that the use of existing social capital and the creation of new social capital through microfinance leads to better economic results. The more client groups meet, the more likely the participants are to ask for help or to have financial transactions outside the family. Furthermore, participants with frequent group meetings were four times more likely to be able to repay their next loan. With this, Feigenberg et al. (2010) confirm that microfinance programs can create and reinforce social capital in an economically useful and sustainable way. However, microfinance could also have negative effects on the social capital within the community, especially when people have trouble repaying their part of a collective loan (Banerjee & Jackson, 2016).

3.2 Community effects of microfinance

Several authors (Zohir & Matin, 2004; Zeller & Johannsen, 2006; Mathew, 2008) argue that microfinance clients might provide positive spillovers for the poor non-participants and communities overall. With research on income inequality in Ghana, Mathew (2008) gives weak evidence of the existence of microfinance spillovers on the community-level: The study finds that the total communities in which the microfinance program was implemented went from significantly poorer to not-significantly richer compared to the control communities. With this, Mathew (2008) shows that presence of a MFI increases the income of participants without increasing the inequality in the community. Sometime after the implementation of the microfinance project, the inequality in the community might decrease, suggesting that the benefits of the project spilled over to the other poor within the community. These spillover effects could for example arise from the creation of new jobs (Zohir & Matin, 2004), increased consumption of participants and the opening of new business (Matthew, 2008) or shared knowledge (Mosley & Rock, 2004).

Using household panel data from Bangladesh, Khandker (2005) explores microfinance benefits for both participating and non-participating households. The results show that microfinance has a large impact on welfare of borrowing households, as their consumption increases. Also, there are positive spillover effects for the local welfare if women borrow: If past loans of women are on average 10% higher, the average household consumption within the village increases with 0.7%, and this of non-food consumption, which are often more durable goods, with 1.2%. On a macro-economic level, Khandker (2005) shows that between 1991/1992 and 1998/1999 rates reduced more in microfinance program

areas than in areas without microfinance, however not significant. Aggregating participating and non-participating household in villages, microfinance reduced moderate poverty by around 1.0 percent point and extreme poverty by 1.3 percent point every year. With this, microfinances accounted for about 40 percent of the total poverty reduction in rural Bangladesh.

Khandker & Samad (2014) analyse the effects of microfinance on the household and village level in Bangladesh. Just like Khandker (2005), this study finds externalities for female borrowing: If women of the village borrow on average 10 percent more, the average value of non-land assets increases by 0.42 percent and this of the households by 0.47 percent. However, educational enrolment of girls tends to decrease when women borrowing increases. Furthermore, Khandker & Samad (2014) suggest that there are diminishing economies of scale, as past loans of the village lead to lower non-land assets. On the other hand, past there is a positive relation between past loans and boys' schooling, which might amplify the village welfare later on.

In Khandker (2005) and Khandker & Samad (2014), most spillover effects are only found when females are the borrowers. According to Khandker & Samad (2014), this might come forth from the higher participation rates and loan values among women compared to men, making the spillover effect more powerful and hence significant.

Other studies have examined the wider economic effects of microfinance by looking at the macro-level effects. By comparing microfinance information with the macroeconomic statistics of different countries, Alimukhamedova & Hanousek (2015) find that microfinance has a significant effect on the wider economy. Microfinance appears to be positively related to economic growth, income equality and financial sector development. These effects appear to differ by country, with stronger effects in more stable and developing regions. In a similar research, Imai et al. (2012) match country-specific data on microfinance with World Bank data. By showing lower poverty indices for higher microfinance loan portfolios, this research suggests that microfinance reduces poverty on the macro level. Buera et al. (2012) analyse the effect of microfinance projects on the macro-economy, using equilibrium models. The model shows that microfinance can have significant distributional impacts economy wide: the vast majority of the population will have some small profit of microfinance programs, due to a small increase in equilibrium wages. This increase in equilibrium wages is also found by Kaboski & Townsend (2012). Using panel data and comparison across villages, Kaboski & Townsend (2012) find that village funds in Thailand have also increased income, consumption and agricultural investment. However, overall asset growth declined for microfinance lenders.

Spillover types and loan use

In a special issue on wider impact of microfinance, Chowdhurry et al. (2004) find several mechanisms for wider social impact, namely: institutional inspiration, community involvement and other social spillovers, economic spillovers such as derived demand and the provision of public goods. Spillovers are thus part of the wider impact. However, no clear definition is given and terms like 'wider', 'indirect' and 'social' seem to be often used as synonyms. In this thesis, spillovers are defined as the externalities that affect the economic wellbeing of non-participating households living in the microfinance area. These are not only the direct effects on income and expenditures, but also factors that indirectly

influence a household's economic wellbeing, such as human and social capital and the presence of public facilities.

Zohir & Matin (2004) set out a framework to measure the wider impacts of microfinance institutions, which do not only include the direct effects for participants, but also the indirect effects spilling over to non-participants and playing at the meso- and macro-economic level. According to Zohir & Matin (2004), there are two main sources of wider impact for microfinance, namely by the way in which borrowers use their loan and by the microfinance institution itself as a new actor in the market. This thesis focusses on the spillover effects of microfinance projects, which relates to the wider impacts from loan use rather than from the role of the institutions itself. So, the types of possible spillover effects mainly depend on the use of the loan, which is mostly consumption smoothing or income-generating activities (Zohir & Matin, 2004).

In the case of consumption smoothing, the loan is used to maintain a certain standard of living in times of fluctuating income and expenditures. The need to do this could arise from variations in income, such as from seasonal work, as well as from lumpy non-income generating expenditures, such as medical expenses. When microfinance achieves to increase smoothing of consumption of participants, non-participants will benefit from the more stable demand throughout the year. This could lead to a better availability of products as well better access to employment. Workers that are only hired during peak periods might however feel disadvantage from this, as their work might not be needed anymore (Zohir & Matin, 2004).

When the loan might be used to generate higher income by investing in the productivity, the spillover effects depend on the sector the borrower is active in. According to Zohier & Matin (2004), the use of credit for agricultural production is expected to lead to an increase of the sales of agricultural inputs as well as raise the agricultural production[2]. Thus, the markets for both agricultural inputs and outputs might grow, leading to increasing employment in these sectors, especially for the market for poultry and other livestock. Eventually, those market changes will reduce the prices of agricultural inputs, which opens up the market, as well as the prices for food and other outputs.

A specific kind of investment in agricultural productivity is the use of loan for hiring or mortgaging-in land. Zohir & Matin (2004) argue that borrowers do this to ensure their own employment, eventually leading to a smaller market for wage labourers and less unemployment. However, the shift to self-employment might turn out bad for the total production if the new owners lack non-tradable complementary inputs, such as agricultural management skills. Zohir & Matin (2004) also argue that the landowning households use the money to send people abroad, thus facilitating international migration of richer individuals.

There is also some evidence of loan use in other activities, which are especially social services (Zohier & Matin, 2004). For education, the yearly average expenditure appeared to be 135% higher for microfinance households than for households that were not in a program (Chowdhury, 2001; in Buiyan et al., 2012). With this extra expenditure, local schools could be improved, and hence an investment is

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[2] Other kinds of income-generating activities are expected to have different spillover effects, which can be found in Zohir & Matin (2004).

made in the human capital and welfare of future generations. However, it has to be noticed that school attendance of 6 to 13 olds was not affected by microfinance (Chowdhury, 2001; in Buiyan et al., 2012), which might suggest that participants send their children to more expensive schools, increasing inequality between participants and non-participants within the community.

Mosley & Rock (2004) and Mosley, Olejarova & Alexeeva (2004) give some evidence on the indirect effects of microfinance on poverty. Three economic spin-offs of microfinance are described in Mosley & Rock (2004). First, through the labour market: When microfinance clients hire new employees, a multiplier is added to the direct effect of microfinance. Regarding poverty alleviation, this spillover has in particular impact when the borrower hires employees from the poorer segment. Second is the generation of human capital through educational expenditures and health improvements, affecting members of poor households. Lastly, social capital that is built within microfinance projects reaches through to non-participants, giving the ability to decrease costs by sharing resources, services and information (Mosley & Rock, 2004). The idea that social capital reaches further than the microfinance project, is supported by Mosley et al. (2004), who find that mutual support between microfinance participants can extend outside the group, by being used for other functions as well as by attracting others who are not in the microfinance project.

Economic theory on spatial proximity

In the economic geography, several theories argue that the productivity of existing firms can affect further growth of the regional economy and thus indirectly influences others in the society. Krugman (1991) argues that growth of economic activity reinforces growth in the same region, as economic growth leads to local economies of scale. Linkages with suppliers and customers create positive externalities for the sector. To profit from those externalities, spatial proximity is needed, because the transaction costs for benefitting from location factors increase with spatial distance (Krugman, 1993). According to Krugman (1991) these increasing returns of scale have less effect on the agricultural sector than on for example manufacturing.

Already in 1890, Marshall wrote about the localisation benefits of proximity to similar sector businesses that could lead to economic growth. Marshall (1890) named three reasons for these agglomeration economies: Local non-traded inputs, knowledge spillovers and a specifically skilled labour pool.

Local non-traded inputs are common investments with an immobile character, such as infrastructure. Within a concentration of economic activity, entrepreneurs could enhance their productivity by investing together in shared resources. Microfinance could play an important role in enabling these kind of investments, benefitting a broader range of people than the borrowers only.

Secondly, when several people or businesses within an area perform similar tasks, knowledge and skills acquired by one will be useful for another as well. Geographical proximity and social contact helps knowledge spillover to others in a community, as part of this knowledge is tacit knowledge, which is non-explicit knowledge that is hard to transfer without social contact. Thus, through the increased social capital and knowledge from the microfinance project, other community members might get in touch with new knowledge or skills and hence higher productivity.

Lastly, being close to similar-sector economic growth can create a pool of workers that have skills adapted on the demand of the sector. With this, it becomes easier to hire someone with the right skills, which is more productive than training a new worker. For the agricultural small-holder businesses that get microfinance, this could be in the form of better seasonal labour, but also in the availability of input products.

3.3 Conceptual model

From the literature on microfinance, spillovers and economic geography, the following model and the spillovers from microfinance is established:
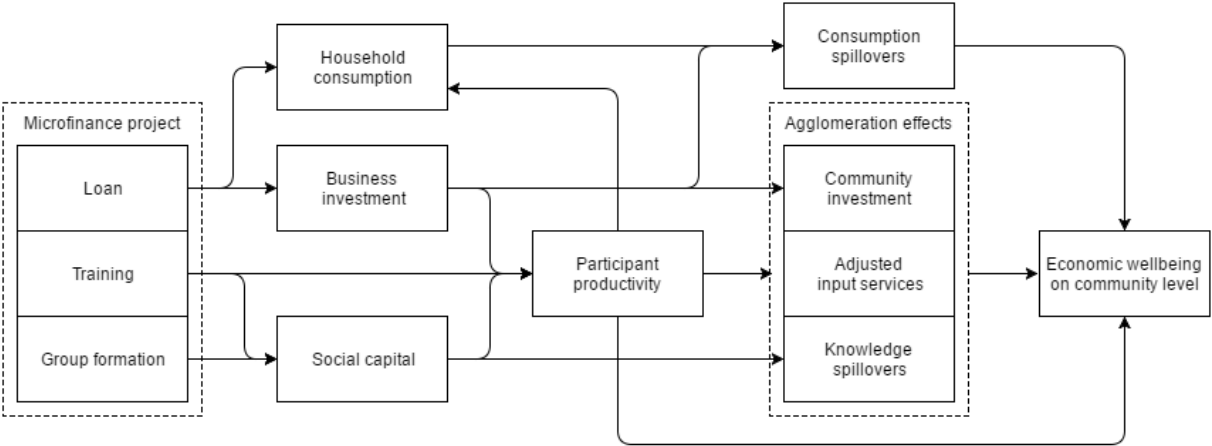
Figure 5. Conceptual Model

As can be seen in the model, a microfinance project often has three main components: Besides a loan, the program provides business training and facilitates group formation. The loan is mostly used for either investment in their own business or for consumption, in which consumption expenditures are predominantly done to smooth consumption or to pay for social services. When facilitating consumption, the loan has positive effects for the market in which consumption takes place and in that way affects the economic wellbeing in the community. Business investment leads to a higher productivity on the micro scale of the participants. This productivity can have positive impacts on household income and consumption. If investments are made by products from local markets, these investments have a positive effect on the sales of other companies, leading to a growing local economy. A specific kind of investment is the investment in common resources, such as infrastructure and facilities that make it easier to do business for all of the community.

The productivity of farmers is also increased by the training from the microfinance program. Furthermore, the combination of training and group formation from microfinance projects supports the creation of social capital within the community. This social capital is expected to have a positive effect on the productivity of the participants as well, and might lead to knowledge spillovers to others from outside the project.

As seen in the economic geographic theory, the combination of growing productivity and proximity is likely to cause three kinds of agglomeration effects: common investment in non-tradable goods, which is especially supported by microfinance loans, sharing of knowledge within the community, for which social capital is an important factor, and the creation of a specifically skilled pool of labour and other

input services. According the theory, those agglomeration economies will stimulate higher productivity and thus economic wellbeing for the community. As the communal economy is an aggregation of the economic situation of all households within the community, there is also a direct effect from the productivity of participants to the economic wellbeing of the community.

4. Methodology

4.1 Methods

For the research, a combination of quantitative and qualitative data is used. Deriving the effects of microfinance projects is hard, as it is not clear how the situation would have developed without the existence of the project (Zohir & Matin, 2004). By comparing the changes for participants of the project with those for similar persons living in the same area, part of the impact of the project will appear. When a comparison is made between the situation, characteristics and behaviour of groups of people, surveys are a useful data source (McLafferty, 2010). Thus, quantitative data can be used to compare the situation of the participants with this of a control group of non-participants to give some insight in how the economic situation and business decisions of participants are affected by the project. This quantitative data comes from a survey that is conducted by BRAC Tanzania among participants of the LEAD project and a control-group of non-participating farmers.

Unfortunately, comparison between participants and non-participants only does not show how the non-participants are affected by the microfinance project, as it does not make clear if part of the changes in the economic wellbeing of non-participants are caused by the microfinance project. To get additional data on the spillover effects to others in the community, interviews are conducted on the community development in combination with the LEAD project. Qualitative data methods allow for detail, context and nuance (Hennink, Hutter & Bailey, 2011), and therefore provide more in-depth information on the reasons behind certain developments. To obtain this information, interviews are carried out with seven participants and six non-participating neighbours of these participants within three different villages. From these interviews, possible spillover effects will be derived. An alternative method could have been focus groups, which could have given even more detailed information on changes in community. However, this method is not preferred due to the restraints in the freedom of speech during group situations in which people know each other.

Additionally, one of the regional project organisers is interviewed to get some additional information on the implementation of the project in the region of the qualitative data collection. This information is used to give an evaluation of the specific project in order to get a better understanding of the context of this case.

In the rest of this chapter, data collection and analysis is discussed for the survey (paragraph 4.2) and the interviews (paragraph 4.3). The last paragraph of this chapter will discuss some ethical considerations.

4.2 Quantitative Data from Panel Survey

Data collection

For the quantitative data, 10 out of the 40 branches in which the LEAD project runs were selected randomly, taking into account that every ecological region is equally represented. BRAC selected a data panel of 3971 farmers with about the same number of respondents for both the maize and poultry sector and for every branch and sector. In October and November 2014, the independent research unit of BRAC carried out a first baseline survey to check whether the respondent group is

representative for the Tanzanian farmers and to get some information on the status of the farmers before implementation of the LEAD project. In October 2016, a second survey was carried out to get an overview of how the project has affected participants. At this time, only 53% of the previously surveyed farmers were found and cooperated under the same name as before, resulting in a final sample of 2109 respondents. According to BRAC Maendeleo Tanzania (2016), tests on the loss of respondents give no indication of attrition bias.

The survey is carried out in Swahili by means of Computer Aided Personal Interviewing: 33 enumerators were divided over the 10 branch areas to carry out the surveys one on one, using tablets with a preprogramed survey. During the enumeration training, it was checked whether the meaning of the Swahili translations matches the English versions of the questions that are used for the analysis.[3]

The panel survey contains two groups of respondents based on their treatment status. The treatment group consists of all farmers that participate or have participated in the LEAD project, meaning that they received training and are assigned to a farmer group. Receiving a microfinance loan was also part of the project, but is caught in another variable since only part of the participants received this loan. Non-participating farmers with similar characteristics are surveyed as control group, in order to separate the project effect from external changes. Furthermore, the respondents are divided by farmer type. Table 1 shows how the number of respondents is divided over both characteristics.

Table 1. Distribution of respondents

	Maize farmers	Poultry farmers	Total
Treatment group	717	588	1305
Control group	443	361	804
Total	1160	949	2109

From the baseline survey, it is concluded that there were no significant differences between participants and other maize and poultry farmers within the same villages at the start of the project, except for two out of the 149 tested variables: Compared to the control group, participants are less likely to sell eggs rather than chicken and participating maize farmers are more likely to purchase their fertilizer at an agro dealer, instead of getting it for free for free (BRAC Maendeleo Tanzania, 2014).

Analysis

Using the difference between the treatment effect and the amount of loan of the respondents received, the effects of the LEAD project can be analysed. The treatment effect is a dummy variable on whether the respondent was initially in the LEAD project. The ratio variable of the loan value is divided into four categories, as the effect of the loan value is not expected to be linear. As described below, several regressions are carried out to show the effects of the project.

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[3] A more elaborated discussion on the data quality and analysis of the baseline and midline surveys can be found in the attachment.

Impact of microfinance project

The first step of the analysis is to detect the impact of the participation in the microfinance project on the economic wellbeing of the participants. This is done by looking at the relation between economic wellbeing and the project variables.

For the economic wellbeing, the respondents are asked in both the baseline and the midline survey: *On a scale of 1-5, where 1 = significantly above average, 2 = above average, 3 = average, 4 = below average, 5 = significantly below average, in comparison to other community members, how would your household rank in economic well-being?* As seen in in Table 2, most respondents state to have an average or below average wellbeing, and only a limited number of respondents believes that their wellbeing is significantly different from others.

Table 2. Categories of economic wellbeing (N=2109)

Survey categories	Baseline	Midline
Sign. below average	26	39
Below average	651	483
Average	1,344	1,411
Above average	70	174
Sign. above average	18	2

Table 3. Change in economic wellbeing (N=2109)

	N	Percent
Decreased	350	16.6
No change	1,189	56.38
Increased	570	27.03

With the answers from the midline and the baseline survey, it is calculated for every respondent whether the subjective economic wellbeing has increased, decreased or remained the same after the implementation of the LEAD project (see Table 3). This variable is used in an ordinal regression to measure the effect of being in the LEAD project. The first model includes only the dummy variable on the treatment groups as independent variable. In the second model, the different categories of loan amount are added to evaluate the utility of loan within the project. In the further models, control variables are added to control for farm and respondent characteristics. As the project for maize farmers is implemented differently and discusses other topics than this for poultry farmers, impact is expected to differ between those groups. Therefore, all models are carried out separately for both farmer types.

Effects of farmer contact

As shown in the literature review, social capital is expected to enhance the impact of the project by increasing the productivity and encouraging spillover effects. Therefore, the relation between social capital and project impact is studied, as this can suggest the existence of spillover effects. The effect of the strengthening of social capital can be measured by the amount of contact within the project group, using the question: "*How many LEAD farmer group meetings did you participate in the last one year?"* This ordinal variable will be used in an ordinal regression on the previously used change in economic wellbeing, in order to show the role of social contact in the project impact.

Table 4 shows the number of times the categories of this ordinal variable are chosen. Due to the high number of missing values (27% of the treated respondents), a different category is created for these cases. As only the treatment group has participated in LEAD meetings at the midline survey, the cases

of the baseline and control group are recoded to none. Lastly, the variable is recoded into five categories in order to have enough cases in every category, as shown in Table 4.

Table 4. Outcome frequencies of LEAD group meetings

Survey categories	N	Percent	Analysed categories	N	Percent
Several times per week	86	2.0%	*At least weekly*	170	4.0%
Once a week	84	2.0%			
Every two weeks	33	0.8%	*1 or 2 times a month*	599	14.2%
Monthly	566	13.4%			
Less than once a month	190	4.5%	*Less than once a month*	190	4.5%
Unknown	346	8.2%	*Unknown*	346	8.2%
None (reference)	2,913	69.1%	*None (reference)*	2,913	69.1%

Community effects

As part of the answer on the third research question, the survey data is used to compare the treatment and control farmers on how they possibly affect the community. For this, information on money spend to hire labour and the community involvement of the respondent are compared between treatment groups and for the amount of loan received.

The information on labour spillovers comes from the questions "*Did you encure any costs in the following maize farming processes / poultry rearing processes?*", followed by the questions "*What quantity of hiring labour did you procure?*" and "*How much did hiring labour costs per unit procured?*" if the option 'hiring labour' was chosen for the first question. From this, the costs of hiring labour could be calculated. As the available baseline dataset only contained an already calculated variable of labour costs rather than the three separate questions, calculation and handling of errors might be somewhat different between the baseline and midline data. This can also be seen from the big difference in mean labour costs (see Table 5). Because of this bias, the change in labour costs cannot be properly calculated. Therefore, the labour costs after the start of the project will be regressed, using the baseline labour costs as control variable.

Part of the measurement error was caused by enumerators filling in the quantity as total costs rather than a number. In order to avoid abnormal high sums of labour costs, the units used in the midline were divided by the costs per unit when the number of units used were higher than the per unit costs of more than 1000 Tanzanian Shillings. To better deal with the possible measurement errors, skewness to the right and the high number of respondents without any labour costs, the labour costs are divided into categories as shown in Table 6. Poultry farmers are excluded from the final analysis, as only 9 of the 949 poultry farmers mentioned that they had labour costs in 2016.

Table 5. Mean and SE labour costs

	Baseline		Midline	
	Control	**Treatment**	**Control**	**Treatment**
Mean	45791	44261	8971	14469
Std. Err.	2602.6	2191.1	1188.0	1732.6
N	688	1089	702	1189
Missing	116	216	102	116

Table 6. Categories of labour costs

	Maize			Poultry	
	Baseline	**Midline**		**Baseline**	**Midline**
No labour costs (reference)	103	731		150	801
1 - 25000 TZS	251	86		309	0
25001 - 50000 TZS	336	154		185	5
Over 50000 TZS	351	110		92	4
Missing	119	79		213	139

Community involvement is an ordinal variable, measured by the question: "*In the past year, how often did you on average meet to help members in your community or collective community projects?*" Table 7 shows the categories used for this variable. Unfortunately, this question was not included in the baseline survey, so a cross-sectional comparison between the current effects is used instead of an analysis of the effects over time.

Table 7. Outcome frequencies community involvement

	Freq.	**Percent**		**Freq.**	**Percent**
None (reference)	1,342	65.85	*Not*	1,342	65.85
Less than once month	131	6.43	*Less than monthly*	131	6.43
1-3 times a month	465	22.82	*1-3 times a month*	465	22.82
1 or 2 times a week	38	1.86	*At least weekly*	100	4.91
Multiple times a week	57	2.8			
At least every day	5	0.25			
Missing	71		Missing	71	

For both labour costs and community involvement, an ordinal regression is done, using the treatment variable in the first model and adding the loan amount and the control variables for region, gender and age for both dependent variables as well as previous labour costs and acres of land owned in 2014 for the variable labour costs.

4.3 Qualitative Data from Interviews

In addition to quantitative data, thirteen semi-structured interviews are carried out to get some insight in the possible effects of microfinance for non-participants. The respondents were interviewed in Swahili with help of an English-Swahili translator. Interviews were conducted in the area of BRAC's Nyegezi branch office, which is in the region Mwanza. This area is chosen regarding both the good results expected by the project organisation as well as the availability of a translator.

Respondents

The interviews are carried out in the villages Mahina, Luchelele and Buhongwa in the region Mwanza (see map of Figure 4, page 9). In all three villages, at least one participant of the project and one non-participant were interviewed. The areas are chosen based on the availability of the translator, who was gathering quantitative data for the LEAD midline questionnaire at the same time, and the

accessibility of respondents. Unfortunately, this resulted in interviews in villages in which expected impact of the project was not optimal, because agricultural loans were not given out to all of the participants. Specific information on these communities cannot be given, as village borders are not precise and small-scale data is hardly available.

The respondents are found based on convenience sampling and snowballing: The respondents participating in LEAD are asked to cooperate after they are interviewed for the panel survey. The other community members are found by asking the participating panel survey respondents to name persons who they think would want to contribute to the research. The advantage of the snowballing technique in this study is that the project participants will most likely name persons whom they are close with or work with, which are also the community members who are expected to notice most of the LEAD project. As this part of the research is more about identifying the possible effects rather than providing a representative overview, the aim is to interview community members that are more affected by the project than the average community member. Besides snowballing, non-participants are found by convenience sampling, as some of the control farmers of the quantitative data are interviewed.

During the interviews, repetition of answers was found quite a lot when it comes to the main changes within the community. For this reason, it was decided that six participating respondents and six non-participating respondents would be enough to get a view of the spillover effects of this microfinance project. Although increasing the number of interviews could slightly increase the chance to find new evidence for other spillover effects that apply for part of the community members only, this is not done because of constraints in time. As a seventh participating farmer was already asked for the interview by the community head, a thirteenth respondent was added.

Table 8 shows some information on the people that were interviewed. Seven of the respondents are participating in the LEAD project, of which three in Mahina, two in Luchelele and two in Buhongwa. Three of the participants were in the project for poultry and four for maize, and four were the leader of their group whereas the other three were not. Furthermore, six non-participants were interviewed, of which one in Mahina, two in Luchelele and three in Buhongwa. Of these six people, four were involved in maize farming and none were focussing on poultry farming. The other two respondents were housewife or fisherman. Except for one, all respondents were married and had children, and some had grandchildren, which is in line with the selection criteria for project participants. Non-participants were not selected on this criteria, but lack of diversity can be devoted to the fact that being married with children is the most common household status in the Tanzania, especially in the rural and less developed areas.

Table 8: Respondents

Id	Order	LEAD participation	Farmer type	Loan	Area	Gender	Age
NP1	3	No	No	-	Mahina	Female	25
NP2	6	No	No	-	Luchelele	Male	28
NP3	8	No	Maize	-	Luchelele	Male	39
NP4	10	No	Maize	-	Buhongwa	Male	49
NP5	11	No	Maize	-	Buhongwa	Male	44
NP6	13	No	Maize	-	Buhongwa	Male	29
P1	1	Lead farmer	Poultry	No	Mahina	Female	?
P2	2	General farmer	Poultry	No	Mahina	Female	27
P3	4	General farmer	Poultry	No	Mahina	Female	30
P4	5	Lead farmer (wife)	Maize	Yes	Luchelele	Female	32
P5	7	Lead farmer (husband)	Maize	No	Luchelele	Male	34
P6	9	Lead farmer	Maize	No	Buhongwa	Male	53
P7	12	General farmer	Maize	Yes	Buhongwa	Male	52

Content

The main topics of the interview were the things non-participants know and notice about the LEAD project as well as the current community development in terms of welfare, use of techniques, public facilities and social structures, including the main reasons for these developments. The reason to ask for community developments is that this might reveal changes affected by the project, although the respondents have not yet linked them to the microfinance project. The interview guide that has been used can be found in the attachment (§8.3).

On average, the interviews took around 20 minutes. The interviews were carried out with help of a translator, which was an intern of the BRAC research unit and enumerator for the LEAD questionnaire. For a smoother conversation, the translator mainly followed the interview guide herself, giving the interviewer summaries and the option to ask additional questions after every answer. With consent of the respondent, the interviews were recorded using the voice recorder of a mobile phone. Afterwards, the English parts of the text were transcribed. Based on the analysis of these English transcripts, parts of the interviews that were expected most useful for the research were selected. Due to the limited resources, only some of these parts were directly translated from Swahili to English.

Data quality

Positionality (Smith, 2010) is one of the main challenges when conducting the interviews. Because of the differences in language and origin, the respondents will definitely see the researcher as an outsider. Especially in the poorer parts of Tanzania, western people are often seen as people who come to sponsor the poor. Respondents might emphasize their problems and the things they need to increase their liveability, rather than the thinks that have improved, with the idea that the white person can give them money. The same accounts for people who come from a NGO, like both the researcher and the translator, as they might come to give development aid. To prevent from positionality bias, a clear and exaggerate explanation is given at the start of every interview to make clear that the answers

do not affect their chance on getting money or inputs. Nonetheless, respondents are still likely to ask whether certain things can be provided, either by the NGO or by the researcher.

Another challenge for the data quality is working with a translator. With the translation to Swahili and back to English, some mistakes in the translation might occur. To account for these mistakes, the meaning of all questions is thoroughly discussed with the translator, and the recordings and English transcriptions are checked by the translator to see if the meaning of the English and Swahili version is the same.

Besides errors in translation, the language barrier gave the researcher less control of the interviews, as it was not possible to give a direct translation during the interview. This made it hard to go in-depth during the interview. Parts of the text were only revealed after the interviews, making it impossible to probe on these parts of the text. Furthermore, the quality depends on the translator and cannot totally be checked by the researcher. For example, at some probes, the translator answered directly without asking the respondent. Due to limited resources, it is not possible to check whether these answers were given by the respondent before, or that they were made up by the translator.

Lastly, most interviews took place outside, which reduced the quality of the recordings. Relatively often, there is disturbance on the recording such as the wind, children or other noises in the surroundings, making it hard to give a clear transcription of the total text. For this, the translation was an advantage, as the answers were recorded twice, making it easier to derive the meaning of the text.

Analysis

As said before, the English parts of the interviews are processed into thirteen verbatim, anonymised transcripts. Using ATLAS-ti, parts of the texts were coupled to several inductive and deductive codes, which can be found in the attachment (§8.5). Two rounds of coding were carried out: In the first round, parts of the text were summarized using mainly inductive codes, whereas in the second round the coded pieces of text were linked to the deductive codes arising from the conceptual model. During the transcription and coding, main information on spillover effects was noted down on paper as well. For all codes, a report was created sorted on whether the respondent is participating in the LEAD project or not. These reports are used for the analysis, with a special focus on the deductive codes.

4.4 Ethics

While doing the research, some ethical questions had to be concerned. In their training, the enumerators were instructed on ethical questions for in the field, which included having a respectful attitude, avoiding making noise, explaining the job to anyone in the research area and being objective. Furthermore, it was made clear that the enumerator should let the respondent know that contribution is voluntary, confidential, anonymous and will not influence future personal returns. It was explained to the respondents that their answers would help to improve future projects, but that there are no direct returns or compensation for the respondents. Only if consent was given afterwards, the enumerators could start with the questionnaire. The same occurred for the qualitative data interviews.

Although it is said that the panel survey is anonymous, the respondents are asked for their names, directions to the house and all kinds of information on the household members. Because of this, the

feeling that the questionnaire is really anonymously might be limited. As the respondents that participate in the LEAD project probably want to stay on positive terms with BRAC, they might not dare to be critical on the project, even if it is told that the information will be used anonymously and will not affect their future participation.

To ensure objectivity, the evaluation of the LEAD project is carried out by a separated unit of BRAC, called the Independent Evaluation and Research Cell. Thus, the research is carried out by outsiders, who often do not live in the area and are not involved in agriculture. At first, outsiders coming to ask questions leads to less trust by the participations. But after some explanation or contact with people the respondent knows, the outsider positionality is expected to lead to more independency between answers and future benefits of BRAC, and thus to more honesty and freedom of speech.

In some cases, a small amount of money was given to respondents, for example for volunteering activities or for spending a lot of time to help researchers to find other respondents. It was made clear that this money was given for any of these reasons, and not for participating in the interview.

5. Results

In this chapter, the results of the qualitative and quantitative data analysis will be shown and discussed. First, the direct effects of the LEAD project will be analysed using the survey data as well as some interview data. Afterwards, the creation and the role of social capital within the project is investigated and linked to spillover effects that might exist within the project. Lastly, it is explored in what way the LEAD project is affecting non-participants.

5.1 Participant effects of the LEAD project

Effects on participant productivity:

In the LEAD midline report, BRAC Maendeleo Tanzania (2016) states that the project had some moderate positive impacts on the implementation of new methods and the participant production. However, due to some quality issues with the LEAD panel data on productivity (see appendix §8.1), this thesis will use qualitative data instead of the survey data to analyse the effects of the LEAD project on participant productivity.

From the qualitative interviews, direct effects of the LEAD project appear to be quite present. Most participants say that they noticed some positive effects from the LEAD project, for example:

> P1: She says that the new technology that she has optioned is the technology she obtains from the LEAD project that they have been told how to rear chicken. Because before, she was just, she was just buying the chicken and she was just laying in a local way. Maybe from this she got chicken that were having diseases. So they only get to infect other chicken and then they get ill. But her and her husband, they went to the LEAD place, the BRAC area, so they were told how to rear the chicken in a new good way, so that at the end of the day, she was able to get efficient and enough money …

> P6: Okay, what he is saying, he is getting new knowledge on cultivating, so he has get more content than previous years. This is because of the new technology of farming.

> N4: He has four acres, but he heard that people had fewer acres, like one acre, who are using the new technology of farming, they get more than him who has the bigger acre.

Especially the training, including the sometimes provided free input, seems to have an effect on the productivity of the participants. The effects from the microfinance loan, however, are less clear. Few people (19,4%) take a loan. Reasons for this are that people would only like to have an individual loan, instead of depending on a group, or would not know where they would need the loan for.

> P2: But the only thing that they are asking, they want loan so that they can establish their own project, without depending on the other or a larger group of people.

> P6: He has never get loan; he has never asked for loan […] He didn't see the advantage of having a loan.

Although saying they do not need a loan, people still ask for free input. So to get more impact from the part of the loan within the project, some more work needs to be done in stimulating investing rather than depending on free inputs alone.

The two respondents that did receive the loan are positive about it. One used the loan for buying the new technology from the training, the other for fishing gear, to stimulate their other business activity.

Overall the interviews show that the LEAD project has a positive effect on participant productivity. Respondents are often asking the researchers and project organisation for more training and input, which does suggest that the project is very important for them.

> P7: He is suggesting, that is question number 15, that the NGO should invest more in farming and provide the improved seeds, improved input and obtain sufficient input....

However, this might be caused by positionality: The respondents ask the people from BRAC for aid related to the project because they know BRAC is more able and more likely to organize these kind of things than to consider other requests.

Although a positive effect on productivity is found, it cannot be assumed that the project is the most important factor in the productivity and economic wellbeing of participants. When asking for the main development or reasons for change in wellbeing, other projects, such as physical infrastructure, and macro-level developments, such as the economy and mass communication, are considered of more importance than the use of new technologies or a loan.

> P1: She says, she has seen most of the development in this place, when she lived here four years ago, there was no electricity, no water. But now there is more development.

Thus, in line with the conclusions of Banerjee et al. (2015, p51), microfinance has some positive effects for the participants, but it "may not be the "miracle" that it is sometimes claimed to be".

Effects on economic wellbeing

The effect of the LEAD project on the economic wellbeing of participants can be analysed using the ordinal variable in the panel survey data. Figure 6 shows the change in economic wellbeing, distinguished based on participation in the LEAD project.

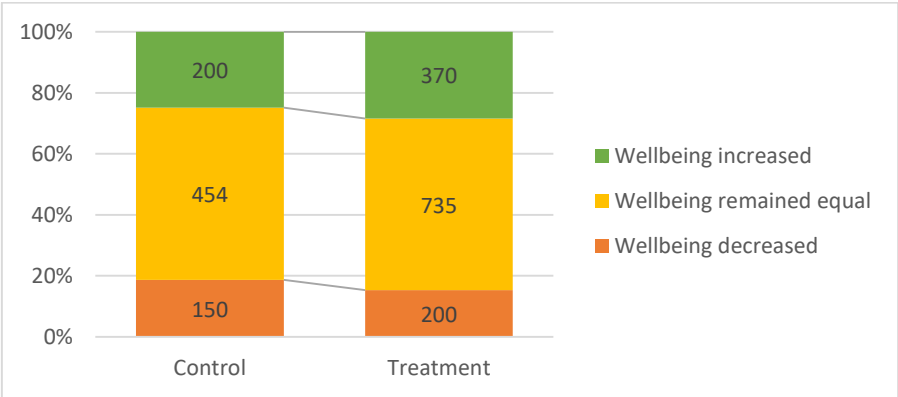*Figure 6. Change in economic wellbeing by treatment*

The figure shows that in both groups most respondents had the same level of economic wellbeing after the implementation of the project than before. But, it can also be seen that the share of farmers that increased their economic wellbeing was higher for the participants than for non-participants, whereas the share that decreased in economic wellbeing was lower.

To check whether the project has significantly changed the wellbeing of her participants, an ordinal regression is carried out on the change in economic wellbeing, adding the treatment effect, loan effects and control variables in the different models. Table 9 shows the results of these regression models, with the variables of interest in bold text.

Table 9. Ordinal regression of economic wellbeing

	Maize		
	Model 1.1 B* (S.E.)	Model 1.2 B* (S.E.)	Model 1.3 B* (S.E.)
LEAD project	**0.10 (0.12)**	**0.11 (0.12)**	**0.20 (0.12)**
Loan 1-300k TZS (ref: 0)		**-0.13 (0.23)**	**0.07 (0.25)**
Loan 300k-500k TZS (ref: 0)		**-0.03 (0.26)**	**0.28 (0.28)**
Loan over 500k TZS (ref: 0)		**0.13 (0.21)**	**0.25 (0.24)**
Owned 1.01-3 acre (ref: <=1)			-0.30 (0.16)
Owned > 3 acre (ref: <=1)			-0.25 (0.19)
Branch location (10 cat)			3/9 significant
Gender (ref: Female)			0.17 (0.12)
Age (in years)			0.00 (0.00)
Cut: Wellbeing – average	-1.45 (0.10)	-1.44 (0.11)	-1.10 (0.54)
Wellbeing – above average	1.16 (0.10)	1.17 (0.10)	1.78 (0.54)
N	1160	1156	1156
X² (LR)	0.68	1.53	140.10***
Pseudo R²	0.0003	0.0007	0.0620
	Poultry		
	Model 1.1 B* (S.E.)	Model 1.2 B* (S.E.)	Model 1.3 B* (S.E.)
LEAD project	**0.33* (0.13)**	**0.32* (0.13)**	**0.31* (0.14)**
Loan 1-300k TZS (ref: 0)		**0.26 (0.21)**	**0.14 (0.21)**
Loan 300k-500k TZS (ref: 0)		**-0.31 (0.30)**	**-0.23 (0.31)**
Loan over 500k TZS (ref: 0)		**-0.07 (0.26)**	**-0.10 (0.26)**
Owned 1.01-3 acre (ref: <=1)			-0.19 (0.15)
Owned > 3 acre (ref: <=1)			-0.51* (0.21)
Branch location (10 cat)			4/9 significant
Gender (ref: Female)			-0.18 (0.14)
Age (in years)			-0.01 (0.01)
Cut: Wellbeing – average	-1.56 (0.12)	-1.56 (0.12)	-1.76 (0.32)
Wellbeing – above average	1.08 (0.11)	1.08*** (0.11)	1.04 (0.31)
N	949	948	948
X² (LR)	6.54*	9.65*	79.30***
Pseudo R²	0.0036	0.0053	0.0432
			* p < 5%, ** p < 1%, *** p < 0.1%

First of all, Table 9 shows that the regression models can only explain a small part of the change in economic wellbeing, especially when the control variables are not added. Therefore, the found effects are expected to be limited in size and might change when additional characteristics are taken into account. Nonetheless, the regressions show that poultry farmers in the LEAD project are more likely to have increased their economic wellbeing after participating, compared to non-participants. This effect is also significant when controlled for personal and farm characteristics, namely location, previously owned land, and age and gender of the respondent. For maize farmers, however, this effect on economic wellbeing does not appear from the survey data

Another treatment effect that can be distinguished is the loan that some participants got. The analysis however shows that receiving a loan has no significant effect on the change in wellbeing, so the panel data gives no evidence that a microfinance loan affects economic wellbeing.

All in all, the ordinal regression shows that the LEAD project has some positive impact on the change in economic wellbeing of the participating poultry farmers, but no clear impact is found from the maize project and the microfinance loan.

Effects on expenditure:
Besides effecting the productivity, microfinance can also be expected to influence the expenditure of the participants. The money from the loan and any additional money due to increased productivity can be used for investments in the business or for household consumption.

During the qualitative interviews, only few respondents appeared to have done extra expenditures as a result of the project. As discussed before, loans were used to invest in farming inputs and fishing gear. From the other interviews, there was no clear result on increased investment. Most farmers did not get any money from their maize or poultry, as only a small part of the farmers sold their agricultural products (at time of the midline survey, 24% sold maize and 53% eggs and/or chicken). This means that except for the respondents that received a loan, most respondents had limited money to spend from their agricultural activities.

When it comes to consumption, most people mentioned that their consumption had increased, however not because of gains from the project. When asking about the change in consumption, most people state that their consumption has increased, because of the growing families.

> P4: She says that consumption increases, because of family growth. She has to buy more food to feed the whole family, because the consumption has been growing bigger.

This suggests that household consumption is mostly based on the need for food, rather than on the income. Because of this need-based consumption, an increase in the production of food as a result of the project might even lead to less expenses for household consumption, as people have to buy less food.

The money saved from reduced consumption or earnt with extra sales enables some households to spend for other causes. Two of the participants without loan used the extra income from increased productivity to pay for education:

> *P1: "Her and her husband, they went to the LEAD place, the BRAC area, so they were told how to rear the chicken in a new good way, so that at the end of the day, she was able to get efficient and enough money, so that she took her children, the girl and the boy, in the boarding school in Dodoma."*

This is in line with Chowdhury (2001; in Buiyan et al., 2012), who found that households in microfinance projects spend more money on education, compared to other households.

5.2 Social capital within the LEAD project

Creation and existence of social capital:

It is expected that the LEAD project enhances social capital among participants, especially from group formation in combination with training. From the survey data, some evidence is found on the creation of social capital when it comes to community involvement of participants, which is discussed in paragraph 5.3. The qualitative analysis however, does not show any evidence on an increased social capital due to the project. When asked about the project, social connections or change in social structures, the respondents do not talk about the group formation, except for telling that they do not want to be dependent on their group for a loan.

Striking is that another kind of project, called SACCOs projects (Savings and Credit Cooperative Organizations) is often referred to in combination with the social structure or changes in the community. Within these projects, people meet weekly to discuss their difficulties, and money is circulated to help people in their problems.

> *N3: In this region, there is a very good project, making him to be connected and all have a good communication. […] but contribution 1000 at the end of the month, that money is been used to assist people who maybe get a funeral, people who look, maybe to the wedding. So that thing makes it to have a very good connection.*

> *P3: The same thing, the SACCOs thing has made her to be close to other people. In times of difficulties and other stuff. I: Okay, so mostly for difficulties. And where do they meet, for example? […] T: The school, the primary school. […] T: Once in a week they meet.*

Thus, although both projects include group meetings and loan access, SACCOs show to have more effect on social capital by giving a central role to her social and communal function, rather than focussing on training and implementation only. Overall, the social contact within the communities appears to be quite good: people have good contact with others and they have their ways of helping each other in case of problems or events.

> *P6: So he is saying that people around here they have a very good response to the question, like the funeral, wedding and assisting if one in farming activities. So the risks containing us all, from there it cannot engage or should engage in farming activities. Making that a good communication in the community.*

> *P7: He says these people, it is just the same answer as the previous person, they live a communal live and they dare to help. If it looks that somebody doesn't have, they look for a solution.*

These descriptions of the social structure of the community show that the communities have a great amount of bonding capital (Woolcock and Narayan, 2000): They help each other to 'get by' and in this way deal with vulnerabilities within the community.

When it comes to bridging social capital, which people can use to 'get ahead', the situation is different. Information and new technologies on farming are discussed by part of the respondents only. Furthermore, no case is found in which one of the main changes in the society, such as physical infrastructure, new technology or community gathering, are initiated from within the community: The discussed developments were always organised by the government or an NGO. Another example of the limited bridging capital are the numerous requests towards BRAC and the researchers for new input and information on farming decisions, even though the respondents were told before the interview that the interview will not affect their input directly. Requests like this are supposed to be discussed and treated during the monthly group meetings of the project. These results match the conclusion of Banerjee & Jackson (2016), who state that in despite of great bonding capital, the bridging capital in rural areas of developing countries is limited.

Spillovers within the project

To get insight in the role of social capital within the LEAD project, the effect of the number of meetings within the respondent's LEAD groups will be analysed. In order to do this, the project participation variable from the previous analysis on economic wellbeing is replaced by an ordinal variable on the number of meetings. The results of this regression are shown in Table 10 (page 33).

Despite the small explaining power of the models, the ordinal regressions show that the number of LEAD group meetings attended has a significant effect on the development of a participant's economic wellbeing. As expected from the theory and conceptual model, participating farmers are more likely to improve their economic wellbeing when they attend group meetings one or two times a month. Oddly, this relation is also significant for participating poultry farmers who did not know or did not fill in this question, but not for participants who meet most often, and therefore were expected to have even more social capital and might encounter spillover effects from within the project.

Strikingly, maize and poultry farmers who have meetings less than every month appear to have a more negative change in economic wellbeing than non-participants. This could mean that being in the project would have negative effects on the participants when they do not meet regularly to share information on how to deal with the new methods or the loan. Another possibility is that this group is disappointed by the LEAD project or other developments in their economic status from the last years, making them more negative about both the project and their economic wellbeing, possibly in order to get more aid and free inputs.

Overall, participants who attended more group meetings seem to have a higher economic wellbeing than those with few meetings or those outside the project, but this relation is not always significant at the 95% confidence level. Although this gives some evidence of social spillovers within the project, the results are not clear enough to confirm that group meetings increase the economic situation by creating spillover effects.

Table 10. Ordinal regression of group meeting effects on economic wellbeing

Maize		
	Model 2.1 B* (S.E.)	Model 2.2 B* (S.E.)
LEAD group: At least weekly (ref: non-participant)	**0.43 (0.23)**	**0.45 (0.24)**
LEAD group: 1 or 2 times a month	**0.14 (0.14)**	**0.36* (0.15)**
LEAD group: Less than once a month	**-0.69** (0.21)**	**-0.70** (0.22)**
LEAD group: Unknown, but participant	**0.35* (0.18)**	**0.30 (0.19)**
Loan 1-300k TZS		**0.01 (0.25)**
Loan 300k-500k TZS		**0.22 (0.28)**
Loan over 500K TZS		**0.19 (0.24)**
Owned 1.01-3 acre before project (ref: <=1)		-0.28 (0.16)
Owned > 3 acre before project (ref: <=1)		-0.21 (0.20)
Branch location (10 cat)		3/9 significant
Gender		0.15 (0.12)
Age		0.00 (0.00)
Cut: Wellbeing – average	-1.47 (0.11)	-1.39*** (0.53)
Wellbeing – above average	1.18 (0.10)	1.53*** (0.53)
N	1160	1160
X^2 (LR)	24.01***	163.83***
Pseudo R^2	0.0106	0.0725
Poultry		
	Model 2.1 B* (S.E.)	Model 2.2 B* (S.E.)
LEAD group: At least weekly (ref: non-participant)	**0.39 (0.23)**	**0.38 (0.25)**
LEAD group: 1 or 2 times a month	**0.31 (0.16)**	**0.34* (0.17)**
LEAD group: Less than once a month	**-0.32 (0.25)**	**-0.6* (0.26)**
LEAD group: Unknown, but participant	**0.62** (0.18)**	**0.59** (0.19)**
Loan 1-300k TZS		0.15 (0.22)
Loan 300k-500k TZS		-0.18 (0.31)
Loan over 500K TZS		-0.08 (0.27)
Owned 1.01-3 acre before project (ref: <=1)		-0.18 (0.15)
Owned > 3 acre before project (ref: <=1)		-0.52* (0.21)
Branch location (10 cat)		4/9 significant
Gender		-0.21 (0.14)
Age		-0.01 (0.01)
Cut: Wellbeing – average	-1.57 (0.12)	-1.83 (0.32)
Wellbeing – above average	1.09 (0.11)	1.01 (0.31)
N	949	949
X^2 (LR)	18.83***	97.53***
Pseudo R^2	0.0102	0.0531
		* p < 5% , ** p < 1%, *** p < 0.1%

5.3 Spillovers to non-participants:

From the qualitative interviews, few spillovers from the LEAD project to non-participants were found. Some of the non-participants mention that the project affected them because they gained some information on it or because the project evaluation gives some attention to their needs. Besides the directly mentioned information, the qualitative data contains some suggestive, but weak information for the existence of other spillovers.

Knowledge spillovers

The effect that appears to be most present for non-participants is the opportunity to gain information. All interviewed non-participants heard about the project before, partly because BRAC came to register the non-participating farmers before the project, but also because people talk about it.

Some of the non-participants gained new knowledge by discussing the new techniques and skills with farmers that are in the LEAD project. Most of the non-participating farmers heard about the advantages of using improved seeds and other inputs, and one of the farmers started applying planting in formation after hearing about it from a friend who is in the project.

> *N5: Because they are living a social live or communal live, so even for cultivation, they sit together and they discuss, asking each other when are you doing cultivating time, when are you doing cultivation, how are you going to do it. So they have a communal live.*

> *N4: What I can say, treatment and control farmers, sometimes they come together and discuss. He is a control farmer; he sometimes meets with the treated farmer. […] he already told me about (applying) planting in formation.*

However, not all farmers are used to discussing information and ideas on business with others in the community, even one of the community leaders stated not to do this.

> *N3: He says that, BRAC, he doesn't happen, because first he is a control farmer, and other people discussing household, farming, maize, because he has very limited knowledge on these things. Unless he wants to get knowledge, to get educated and these things, then he can get in that. For the time being, it is not.*

> *P6 (Lead farmer): He has never done this (discussing farming information).*

Multiple non-participating respondents say that they would like to be in the project. This means that non-participants did hear about the training and have a positive opinion on it, but the information they get mostly appears not to be enough to apply without training. For example, the man (N4) who started applying planting in formation is still wanting to have the training to learn about the inputs he can use. From this, it is suggested that knowledge spillovers are more likely to have an effect when no money is needed to apply the new techniques.

> *N4: He is saying that the project has a positive effect if you receive training. He is a control farmer, so he has never received the training. But he expects something good out of it.*

N6: His opinion is that, if he can obtain training, he knows what to do.

One of the major constraints of this project when it comes to non-participants applying knowledge that has spilled over from the treatment farmers, is that a lot of non-participating farmers are still waiting to participate in the LEAD project themselves and get free seeds and additional knowledge. Most non-participating farmers are registered before the project started, and from this registration a selection of participants is made. However, some non-participating farmers are thinking they will be in the project because they are registered, so they are waiting for the project organisation of BRAC to come to them.

N5: But in terms of if it has helped him, he says that it has not helped him yet. Because he has yet not been provided with the improved seed, so the input for maize cultivation. But he just knows it from it. That is what he is taking home from it.

N4: because he is already registered, so he knows that he is already in the register [...] So he is asking for them to come and to provide them with the training and improved seeds.

The idea that they will be in the project later on might limit them in applying new things already, and especially in buying improved seeds as they think they might give them for free later.

Consumption spillovers

As seen in the section on expenditure in paragraph 5.1, few participants actually invest or consume more because of the project. This might explain why no evidence was found on the existence of consumption spillovers from the LEAD project. Nevertheless, two participants state that they can now send their kids to school, thus investing in the human capital and welfare of future generations. One of the respondents send her children to a boarding school more than 600 kilometres away, in this way creating consumption spillovers far outside the community.

The participants who got a loan spend this on inputs like fertilizer and improved seeds, and on fishing material. According to Zohir & Matin (2004), loan use for agricultural inputs will lead to growth of both agricultural input and output market, increasing agricultural employment (discussed under Input services, page 37) and eventually reducing prices of both agricultural inputs and outputs. This last effect is not yet found within the qualitative data: Respondents argue that prices of food are getting higher rather than lower.

Lastly, it must be noted that there is a chance of negative consumption spillovers for food suppliers. As production is often done for own use, participants might buy less food and replace this by their own harvest, especially if prices are relatively high as well.

Community investment

From the theory, it can be expected that microfinance provides opportunities to decrease costs by making common investments, such as in local non-traded inputs (Marshall, 1890) or shared resources (Mosley & Rock, 2004). The loan could be used to invest in improving the facilities of the community, especially if knowledge and social capital are stimulated as well. From the interviews with participants

and community-members, however, no evidence was found on the existence of new community investment because of the project.

As the project focusses on small, hardly-sharable improvements for farmers, such as seeds, fertilizer, vaccinations and improved chicken, investments will most likely be done on a farm-level rather than on the community level. Other projects, focussing on more expensive and better shareable investments, might be more suitable in stimulating community investment. For example, another project on the use of cows for agriculture, which some non-participating respondents are in. One of them says that sharing input, such as a machine, is an option:

> *N3: Because if it comes for the plough, he can also give out his cows and help with the other farmers. So what he need is only the machine.*

According to the interviewed program organizer, the LEAD project does give some options for sharing input and sharing marketing costs, which are also explained during the trainings. But, empirical evidence on collaborations like these are not found from the data.

Of course, only two of the interviewees did take the loan, so no clear overview can be given of the way other loans are invested.

Input services

Focussing on a specific sector, microfinance projects might stimulate the establishment of specific local input services, such as a skilled workforce or adjusted input dealers. From the interviews, no empirical evidence is found on this spillover. Nevertheless, quantitative data shows that the project can stimulate hiring of labour.

One of the project objectives is to create vertical linkages between the farmers and the input and output markets. Within the LEAD project, BRAC gives some farmers their first round of input for free. So, at the start, there is no need to establish input services. Most respondents state that they have seen the positive effects of using improved input. After that, the created network is supposed to be used in order to get new input. However, when asking for the effect of the project, evidence is found on the lack of these networks, rather than on the existence of new linkages. People come to BRAC to ask for new free input, but most of the respondents do not want to buy the new inputs themselves.

> *P7: The NGO should invest more in farming and provide the improved seeds, improved input and obtain sufficient input.*

> *N5: If they get the seed for free, they will put all their power in trying to cultivate maize to improve their economic wellbeing. [...] No, he won't be able (to buy), the economic status is not good.*

As the project creates only limited demand for non-free inputs, the market for input services has only limited opportunities to grow.

<u>Labour spillovers</u>

An indicator of whether the LEAD project realises spillovers to input services is the amount of money spent on hiring labour by participating farmers, compared to this of other farmers. As labour hiring hardly occurs in poultry farming, this analysis focusses on maize farmers only. Besides, an ordinal variable is used in order for the analysis to be less dependent on any measurement errors. Figure 7 shows the money
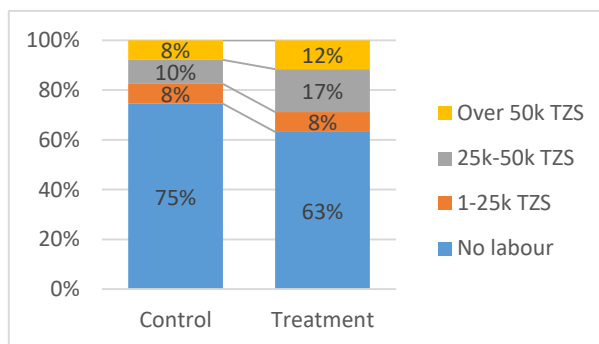

Figure 7. Midline labour costs of maize farmers (n=1081)

spend on labour costs by participating and non-participating respondents after the implementation of the LEAD project. The figure shows that in both groups, most farmers did not hire any labour in the past year. In the same time, the respondents in the treatment group were more likely to spend higher amounts on labour than the respondents in the control group.

Table 11 shows the results of the ordinal regressions on the four categories of total money maize farmers spend on hiring labour in the last season.

Table 11. Ordinal regression of total hiring costs

	Maize		
	Model 3.1 B* (S.E.)	Model 3.2 B* (S.E.)	Model 3.3 B* (S.E.)
Previous hiring costs	0.44*** (0.08)	0.38*** (0.08)	0.07 (0.09)
LEAD participation	**0.59*** (0.15)**	**0.48** (0.15)**	**0.55** (0.16)**
Loan 1-300k TZS (ref: 0)		**0.67** (0.25)**	**-0.02 (0.28)**
Loan 300k-500k TZS (ref: 0)		**1.18*** (0.28)**	**0.19 (0.32)**
Loan over 500k TZS (ref: 0)		**1.05*** (0.22)**	**0.18 (0.26)**
Owned 1.01-3 acre (ref: <=1)			-0.17 (0.2)
Owned > 3 acre (ref: <=1)			0.21 (0.25)
Branch location (10 cat)			1/9 significant
Gender (ref: Female)			0.00 (0.16)
Age (in years)			0.00 (0.01)
Cut: Labour costs of 1-25k TZS (ref: 0)	2.00 (0.20)	2.02 (0.20)	1.65 (0.62)
Labour costs of 26k-50k TZS (ref: 0)	2.43 (0.21)	2.47 (0.21)	2.21 (0.62)
Labour costs of over 50k TZS (ref: 0)	3.47 (0.22)	3.54 (0.23)	3.40 (0.63)
N	968	965	965
X^2 (LR)	53.48***	91.14***	354.79***
Pseudo R^2	0.0282	0.0481	0.1346
			* p < 5%, ** p < 1%, *** p < 0.1%

Table 11 shows that a small part of the variation in labour hiring costs of maize farmers can be explained by being in the project and by the control variables. When participating in the LEAD project, maize farmers are more likely to spend higher amounts of money on hiring labour. A loan might also

have a positive effect on the money spend to hire labour from outside the household, but this effect is not significant when controlled for the different regions.

All in all, these results show that the project generates input spillovers in the form of a wage for hired labour. However, the size of these effects might be limited, as the highest share of the participants still spends nothing on labour.

Other: Spillovers through community involvement

For most of the participants, multiple jobs and other activities are intertwined in their daily live. For example, respondents are working as a housebuilder, teacher or volunteer besides their farming activities. It might be possible that participants have more time and more food security after being in the project, making them more able to do good for the community. Table 12 shows the relationship between the LEAD project and the community involvement of the respondent.

Although both participants and non-participants mostly mention not to help other households or community projects, the ordinal regression shows a strongly significant relation between participation in LEAD and the frequency of giving help outside the household: Both maize and poultry farmers are more likely to help others when they are participating in the LEAD project.

Table 12. Ordinal regression of community involvement

	Maize			
	Model 4.1 B* (S.E.)	Model 4.2 B* (S.E.)	Model 4.3 B* (S.E.)	Model 4.4 B* (S.E.)
LEAD participation	**1.42*** (0.15)**	**1.44*** (0.15)**	**1.56*** (0.16)**	**-**
Loan 1-300k TZS (ref: 0)		**0.50* (0.25)**	**1.06*** (0.28)**	**0.99** (0.29)**
Loan 300k-500k TZS (ref: 0)		**-0.10 (0.30)**	**0.51 (0.33)**	**0.37 (0.34)**
Loan over 500k TZS (ref: 0)		**-0.49 (0.27)**	**-0.03 (0.30)**	**-0.20 (0.30)**
Owned land 1.01-3 acre			-0.09 (0.18)	-0.07 (0.19)
Owned land > 3 acre			-0.20 (0.23)	-0.09 (0.23)
Branch location (10 cat)			4/9 significant	4/9 significant
Gender (ref: Female)			0.31* (0.14)	0.36* (0.15)
Age (in years)			0.00 (0.00)	0.00 (0.01)
Meet at least weekly				**2.62*** (0.26)**
Meet 1 or 2 times a month				**1.82*** (0.19)**
Meet less than monthly				**0.28 (0.31)**
Meet unknown				**0.90*** (0.24)**
Cut: Helps less than monthly (ref: never)	1.64 (0.13)	1.66 (0.14)	2.93 (0.62)	2.18 (0.63)
Cut: Helps 1-3 times a month (ref: never)	1.95 (0.14)	1.97 (0.14)	3.28 (0.62)	2.56 (0.63)
Helps at least weekly (Ref: never)	3.96 (0.18)	4.02 (0.19)	5.51 (0.64)	4.88 (0.65)
N	1116	1112	1112	1116
X^2 (LR)	102.15**	112.10***	263.72***	328.21***
Pseudo R^2	0.0490	0.0543	0.1276	0.1589

	Poultry			
	Model 4.1 B* (S.E.)	Model 4.2 B* (S.E.)	Model 4.3 B* (S.E.)	Model 4.4 B* (S.E.)
LEAD participation	**1.40*** (0.16)**	**1.39*** (0.17)**	**1.41*** (0.17)**	**-**
Loan 1-300k TZS (ref: 0)		**0.46* (0.21)**	**0.63** (0.23)**	**0.5* (0.24)**
Loan 300k-500k TZS (ref: 0)		**0.92** (0.31)**	**1.09** (0.34)**	**0.9* (0.35)**
Loan over 500k TZS (ref: 0)		**-0.02 (0.31)**	**0.17 (0.33)**	**0.13 (0.34)**
Owned land 1.01-3 acre			0.00 (0.17)	0.07 (0.17)
Owned land > 3 acre			-0.25 (0.24)	-0.14 (0.25)
Branch location (10 cat)			7/9 significant	7/9 significant
Gender (ref: Female)			0.26 (0.16)	0.26 (0.16)
Age (in years)			0.00 (0.01)	0.00 (0.01)
Meet at least weekly				**2.13*** (0.3)**
Meet 1 or 2 times a month				**1.77*** (0.2)**
Meet less than monthly				**1.00** (0.31)**
Meet unknown				**0.65** (0.24)**
Cut: Helps less than monthly (ref: never)	1.59 (0.14)	1.68 (0.15)	2.54 (0.40)	2.22 (0.40)
Cut: Helps 1-3 times a month (ref: never)	1.95 (0.15)	2.04 (0.15)	2.94 (0.40)	2.65 (0.40)
Helps at least weekly (Ref: never)	4.12 (0.21)	4.23 (0.22)	5.3 (0.44)	5.08 (0.44)
N	922	921	921	921
X^2 (LR)	83.18***	95.56***	217.40***	252.00***
Pseudo R^2	0.0481	0.0553	0.1257	0.1458
				* $p < 5\%$, ** $p < 1\%$, *** $p < 0.1\%$

Receiving a loan also has some significant positive effects, albeit not for all distinguished loan ranges: The positive significant relations for the lower loans suggest that overall, receiving a loan can have some positive effect on the community involvement.

The fourth model shows the effect of having group meetings on the involvement in the community. Thus, attending project meetings makes the participants more likely to help others within the community. This suggests that the project enhances involvement by creating social capital.

All in all, it can be said that the LEAD project can explain part of the variation in community involvement. From the qualitative data on the other hand, there are no clear results on the effects of the project on volunteering activities or community involvement.

Other: Spillovers through attention

Some of the non-participants mention that the project affected them because the project evaluation gives some attention to their needs. One of the non-participants for example says:

> *N3: He says that the project is, has a very positive, according to him, positive effect, because if this thing was not in contact, we would not be doing follow-up now and then. Like you came from far, from Holland, I came from Dodoma, we all come for the follow-up of this project. Then, from here he is seeing a very positive attitude towards this project. Because if it was not beneficial, we could not do follow-up, recording him and asking question.*

From the evaluation, people can get hope, which might influence their farming decisions and productivity. This is, however, a suggested effect from the midline evaluation rather than from the LEAD project itself.

6. Conclusion and discussion

6.1 Conclusion

To get a better understanding of the impact of microfinance, this thesis has explored the role of spillovers within the wider economic impact of microfinance projects. The research focussed on the case of the Tanzanian LEAD project, which aims to improve the economic liveability of smallholder farmers by means of training, microfinance loans, group formation and vertical market linkages.

The qualitative analysis shows that the LEAD project enables her participants to increase their production. Most of this improvement comes from the training and application of new techniques. The effects of getting a microfinance loan appear less from the analysis, partly because only a small part of the participants received this loan. Similarly, the quantitative analysis shows that the project has a positive impact on the economic wellbeing of the poultry farmers, relatively to non-participating community members. However, an effect is not found for participating maize farmers and no additional impact is found for the participants who received a microfinance loan.

Besides the direct treatment effects, this research analyses whether the effect of the project was reinforced by the creation of new social capital. Although the LEAD project includes a group component, the participants do not experience a change in social capital. Nevertheless, the number of group meetings seems to affect the community involvement of the participants, and thus create social capital. There is also an association between those meetings and the economic wellbeing, in which regular but not weekly meetings have a positive effect and few meetings a negative effect on economic wellbeing. The direction of this relationship is not clear enough to confirm the existence of within project spillovers.

The effect that appeared most tangible for non-participants is the knowledge spillover from LEAD participants to other farmers. All interviewed non-participants knew something about the project, and some non-participating farmers mention that they have learned new methods because of the LEAD project. On the other hand, part of the farmers argues to never discuss farming information and in most cases the new information is not yet applied by non-participants, so there is some potential to gain more impact.

In line with Banerjee & Jackson (2016), it can be concluded that the communities often have strong bonding social capital, but limited bridging capital, meaning that it is hard to achieve a change from within the community. Nevertheless, the panel data shows that participants have higher community involvement than non-participants. By training people, the LEAD project can empower their participants, making them better able to help out the community. The positive relation between microfinance projects and community involvement is in line with Chowdhury et al. (2004) and Mosley et al. (2004), who state that the mutual support from microfinance projects extend to functions and people outside the project. On the other hand, the association between LEAD participation and community involvement might be partly explained by response bias, as project participants might feel more often feel that they have to say they are helpful, in order to show that they deserve to be in the project or to get more training and inputs.

Another spillover that was found is the use of labour input: Participating maize farmers are spending more on hiring labour than non-participating maize farmers. This leads to more employment within the rural areas and might eventually benefit farmers by increasing the availability and specific skills of the needed labour.

When it comes to consumption spillovers and community investment, only limited results are found. Consumption is found to be need-based rather than income-based, and in most cases production is mainly used for own consumption. This suggests negative effects for other food suppliers, as there is less need to buy food. Sometimes money was used for non-food consumption, such as education, which is expected to have a positive effect on the growth and availability of those facilities. On the long run, the chance to invest in education creates more opportunities for the next generation to escape poverty. Investment was only seen from farmers receiving a microfinance loan. These loans were mostly used to buy hardly-sharable agricultural input, which might affect the input sector rather than the average community member. In its turn, the growth opportunities for the input sector are limited because of the low demand for non-free inputs.

So from the case of the LEAD project, it can be concluded that spillovers have some effect on the impact of microfinance. It is hard to gain straight evidence for all effects, but this study affirms that projects for smallholder farmers especially affects the knowledge of other farmers, the profit of the sector for small-scale input products and services and stimulates farmers to help each other. Most of these effects were generated by the training and group formation part of the project rather than by receiving a microfinance loan. Except for some new knowledge, most community members do not directly notice any of these project spillovers to influence themselves, suggesting that the effects on society are not very big.

6.2 Implications for LEAD and future projects

The following paragraph will discuss the implications and recommendations of this research on spillovers for LEAD and other microfinance projects. Off course, the impact of the project and hence the found effects are influenced by its implementation, target group and context, as also shown by the outcome differences between maize and poultry farmers in this study. Some comments and recommendations on the practical implementation of the LEAD project in general can be found in attachment §8.2. Overall this study shows that training and a social setup enhances the opportunities for spillovers of microfinance projects. As explained below, these spillover effects can be encouraged by focussing more on availability and affordability of input, being clear to involved non-participants and targeting 'real' business rather than supply for own consumption.

The analysis shows that microfinance projects like the LEAD project create opportunities for spillovers, especially by including components to increase human and social capital, like training and group formation. Although the respondents do not mention strengthening social bonds from the project, the results show that the project impact is affected by the number of group meetings. Most spillover effects are realised by those training and group components rather than by receiving a microfinance loan. The impact of loan availability might be limited because the low rate of participants that received a loan. Banerjee et al. (2015) argue that in most microfinance projects the demand for a microfinance

loan not very high, because the rate of return might not be high enough and the target group takes loans from others, such as friends, relatives and other money lenders.

This study shows that the LEAD project and the methods learnt in the training helps the participants to increase their productivity, but in the same time farmers claim they cannot afford to buy input or cannot access input. Giving free input or microfinance loans might stimulate farmers to start using the input, but with those products not being easily accessible, profitable or sustainable for future production, farmers stay dependent on BRAC to maintain its impact. Thus, projects in which input is easily accessible or only needed once are better in facilitating long-term impact and spillover effects.

Another factor that halts knowledge spillovers in the case of the LEAD project was the haziness of the organisation towards involved non-participants. Before the start of the project, BRAC came to register all farmers in the project areas, which confused several non-participants on whether they were in the project or not. This resulted in a wait and see attitude among these non-participants, making them less likely to apply new knowledge. Thus, informing non-participants about their prospects for the project could increase application of knowledge among non-participants.

Lastly, the chance of spillovers might be higher for projects that focus on business growth rather than on food supply. Within the LEAD project, limited consumption spillovers were found as a big share of production was for own use and thus relatively few money was generated. This means that projects on food security might be less likely to generate regional economic growth than projects that increase the monetary income of participants. In combination with previous research (Zeller & Johannsen, 2006; Hermes et al., 2011), this study suggests that training and group formation are more effective than providing when targeting a big range of poor people to increase food security and liveability, whereas a loan might have more impact when targeting a small innovative group to boost the regional economy through spillover effects. However, similar research on projects with the latter aim is needed to confirm this assumption.

6.3 Research limitations and recommendations

As this study is an explorative research, it was not possible to test all probable spillover effects. Especially in the results from the panel data, some of the effects tested are chosen based on data availability rather than on theoretical hypotheses. This means that this study is no overview of all possible impact factors nor includes evidence on the most important effects. Also the size of the effects cannot be determined from this kind of study. Further research on this topic is needed to get a full overview of the spillover effects in microfinance projects and the impact of these spillovers.

With the LEAD project, BRAC targets people below the poverty line. Spillover effects are not as important within this target group, as poverty can be reduced without spillover effects. As impact seems to be higher for the less poor households, it might have been good to study the spillover projects of a project not aiming at the poorest. Besides, the researched project focusses on farmers, whereas Krugman (1991) mentions that spillovers are less likely to appear in the agricultural sector than in other sectors, such as manufacturing. Further research on microfinance projects with another target group could be useful to see whether the spillover effects differ by target group.

The empirical analysis of this study focusses on one project in one country. As social factors play a role, spillover effects could be influenced by the context of the project, such as by culture, policies and geographical proximity to others. Therefore, research in other countries might give other results.

Furthermore, there were some limitations on the available data. At the point of evaluation, the project ran for around two years. This means that only short term effects could be evaluated in this study and hence new effects might occur after some more time. Spillover effects in accessibility of input services and prices of products might for example not be (fully) present yet. Thus, research with a longer timespan between the start and evaluation could lead to different results.

Initially, the intention was to select villages which were expected to be affected most by the LEAD project in order to get the most possible effects. However, due to practical constrains, it was not possible to accurately select the villages of the interviews. Because of this, some of the interviews were carried out in areas where only few loans were given out. Further research might find more results of possible spillovers by selecting the communities that are studied more properly.

Although translation is done carefully and meaning of the questions is discussed beforehand, there might be some mistakes in the translation of the survey question and especially in the translation of the interview. For example, the main change in the community, if any, always appears to be in physical infrastructure. From this, it is expected that improving physical infrastructure is more effective for the economic wellbeing than setting up microfinance projects. However, the Swahili version of the question might also point towards physical changes, not leaving the option for any other changes. Translation error might also cause the relatively large number of times when the answer of the respondent does not match question of the interviewer. In these cases, it is not clear whether the respondent does not have any clear answer on the question, or that the question could have been asked differently in order to get a better answer.

Furthermore, cultural differences make it harder to predict possible answers, resulting in some questions that are asked although the answer might be obvious for insiders. This made some questions less useful than expected. With more knowledge on the target group beforehand, more information could come from the interviews.

To derive quantitative evidence on the effects of the project, this research analyses the self-rated economic wellbeing of participants and non-participants. Hence, this variable is subjective and might be biased, for example because the respondents expects to be more likely to get help or extra inputs when giving a certain answer. Information on more direct effects like productivity and income would have been useful to avoid this subjectivity, but was not used in this research because of quality issues. To get a more accurate overview of the effects, further research would be recommended to also measure the effects on productivity, income or expenses.

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8. Attachments

8.1 Quality of the data and report of the LEAD baseline and midline evaluation

The LEAD baseline and midline surveys were carried out in the areas of 10 of the 40 branches in which the LEAD project is active, located in 9 different regions of Tanzania. The sample of those branches was taken at the start of the project as a stratified sample based on the ecological diversity between regions. To have an equal representation, the aim was to select the same amount of farmers in all branches and as much maize farmers as poultry farmers. This means that in the end the research gives a representation of the abilities and chances of the project, rather than on what is achieved, because the sample might not be an equal representation of the current participants.

The questionnaire includes 9 sections with questions on different topics, mainly focussing on first level outcomes, such as technology adoption, received finance and market links, and second level outcomes, like yield, income and economic wellbeing. In the midline questionnaire, questions mostly remained the same as those in the baseline questionnaire, but some new questions were added. After the preliminary questionnaire was completed and checked by several persons, a pilot was done among two poultry farmers and two maize farmers in an area that was not included in the sample. This pilot revealed that the questions were quite clear and easy to answer for the pilot-respondents. Some small changes were made mainly in the new questions. Afterwards, an electronic form of the survey was uploaded in tablets using the program Survey CTO and was translated in Swahili.

For the midline survey, 33 enumerated were temporary hired and divided over the 10 areas. Before the start of the data collection, the enumerators had five days of training, in which they practiced working with the tablet and thoroughly discussed the meaning of all questions to make sure that all enumerators are on the same line as the researchers. Every question was discussed multiple times in both English and Swahili, in which the enumerators gave comments on what is unclear. So, before the start of the data collection, the questionnaire was checked by over 35 persons. Due to this training, using one-on-one interviews can be expected to be a more accurate method than letting the respondents fill in the questionnaire themselves. Nevertheless, it has to be noted that during the five days of training and many repetitions, more and more people got distracted, so there is still a risk of misunderstanding of some questions by part of the enumerators.

Although the thorough preparation of the data collection, some problems occurred in the field that might decrease the quality of the data. Most of the respondents were willing to participate, but not all of them. Especially control farmers, who were less involved in the project, were less likely to participate or were answering the questions while continuing work. As the survey is quite long, for some the respondents the interview had to be done very fast or without the use of the tablet, since the tablet gave the idea that the questionnaire would take a lot of time. In order to finish faster, some questions were filled in with the help of the project organizers of the branch offices rather than by asking the respondents.

Another challenge was finding the respondents, as not all places in Tanzania have clear addresses. Initially the project organizers (POs), who are used to work with the farmers in the field, were supposed to notify the respondents about the survey and come with the enumerators to bring them to the right

persons, but often the POs were not there. With the help of others living in the community, most respondents were findable. However, it is expected that data collection would have been better if the POs would have actually come with the enumerators all the time, so that they could create trust and willingness among respondents and limit the searching time for enumerators.

Lastly, the involvement of the enumerators in the research outcome can be expected to affect the quality of the data. As most of the enumerators were not working for BRAC, but temporarily hired for these four weeks of data collection, they might be less involved than the researchers or others working on the LEAD project. Therefore, having correct answers is less important for these enumerators than for the researchers. By recording the GPS location of the respondents, it is tried to make sure that the enumerators do not just fill in the surveys themselves. However, as not all questions are checked, the enumerators can save time by filling in some questions themselves. The likeliness to do so is raised by the complaints of the enumerators: They had to do too many surveys with limited time and enumerators, the money they got was hardly enough to cover the expenses of living, especially for those who had to stay in a hotel, and the work was made harder by the project officers not being there. All of this increases the risk of having false or inaccurate data.

Some problems could be found in the final data set. There were some mistakes in the interpretation of the questions on costs and production which involved units and prices. In those questions, some enumerators filled in prices per unit whereas other took the total prices. Also the quantities used, such as sacks and buckets were not always clear and accurate. Due to these mistakes, the quality of the variables on production and income was expected too low to use in this research. Another error in the collected data is that part of the control farmers were asked for the number of LEAD meetings they attended, whereas these meetings are meant for treatment farmers only.

Despite the errors in the data, BRAC used most of this data in her report, whereas the quality is questionable. When conducting the midline evaluation, the researchers had a high work pressure: The evaluation had to be finished within eight weeks, including a full week of enumerator training, four weeks of data collection and the preparations for the next round of research. Thus, the two researchers had less than 3 weeks to clean the data, analyse everything and write the report, giving limited time to accurately evaluate the quality of the data and analysis. Errors found for this research were not always yet known by BRAC researchers when their analysis was already finished.

Lastly, the staff working on the baseline survey was different from the ones working on the midline evaluation. In combination with the absence of an administration system, this resulted in the loss of some information, such as part of the raw baseline data and the edits done in this data set. This might have led to some mismatch between the baseline and midline data in the way it is edited.

8.2 Discussion on the LEAD project implementation

Conversations with farmers and LEAD organisation show that overall most people are glad with the project and that non-participating farmers would to be involved in the project as well. Farmers especially like the training and the free input, and they regularly ask for more of this. The loan and market linkages are less clearly appreciated.

Of all the participants in the LEAD project, only 19.1% got the agricultural loan. Reasons for this were mainly the high interest rate, the need for a collateral and not knowing about the opportunity rather than not needing a loan. Another criticism is that the loan needs to be a group loan, whereas people do not want to be dependent on others who might not pay back the loan. On the other hand, a group loan might stimulate social capital and hence within group spillovers or community investment.

One of the components of the project was to make linkages between agro dealers and farmers. However, farmers still ask BRAC organisers and researchers for input, so either the linkages are not clear or strong enough, or the input is too expensive for the farmers to buy. Consequently, the farmers are dependent on BRAC for the application of the new-learned techniques.

One of the weak points of the project is that it is not adapted to the regional context. For example, the region of Dodoma is many years too dry to grow maize, so if a loan is used for temporary inputs for maize farming, their loan might get lost. Similarly, in the region of Mwanza it might be more profitable to go fishing, but the LEAD project stimulates investment in maize and poultry farming. In this way, the regional economy is affected in a way that does not stimulate the best possible use. To counter this, only farmers who were already in the maize or poultry sector can participate in the project, but still adaptation to the regional needs would be good. In Dodoma for example, the project could instruct on irrigation rather than on the use of improved seeds.

For obtaining knowledge and free inputs, the farmers in a group depend a lot on the ability and generosity of the lead farmer and community poultry promotor. These can choose to share improved seeds or chicken, but they can also use for themselves as an example. For example, someone mentioned they got 5 chicken, of which 4 died the same day. So probably there was no good care before and they were passed through at the time they were sick. Although the concept of having one lead farmer might stimulate the creation of bridging social capital and hence spillover effects, more focus could be on choosing the right group leader.

Furthermore, there are some small branch-specific complaints, such as a lot of changes during the project, the project organisers not being available a lot and even participants who state that they did not get any training. These small things might affect the project impact within those branches.

One of the opportunities for microfinance and other aid projects is to work more together. Often, there are multiple projects of BRAC and other NGO's in the same village, but no cases of cooperation are seen. Working together, for example with the group meetings of a SACCOs project, might make it more likely to discuss the project with non-participants and hence create more spillovers.

8.3 Interview guide

Jambo. Habari? Jina langu Wendy, ninatoka Uholanzi, Ulaya, na yeye ni *name translator* ambaye itatafsiri kwangu, kama Kiswahili yangu si nzuri. Sawa? (Hello, I'm Wendy from The Netherlands, Europe, and this is *name translator* who will translate for me as I don't speak Swahili. Is this okay?)

I'm a graduate student in Economic Geography in the Netherlands but I'm staying in Dodoma for this research. Together with an NGO called BRAC I do research at the economic development in the communities BRAC is active in, as well as in the impact of the project of BRAC. To get some inside in this, I conduct several interviews with community members, like this one with you. Unfortunately, participating in the research will not give any direct consequences for you or this village in terms of help, but honest answers will help us to understand the effects of livelihood projects and to improve future programs of NGOs. This interview will take around 30 minutes. The information will be processed anonymously in my thesis and of course you are free to not answer a question or to stop the interview any time you want. Do you have any questions on this?

It would be very useful for me to be able to listen back this conversation later on. Do you mind if I record it on my phone? This is for my own use only and will only record voice, no images.

Start record:

Interview number …, date and place

Personal information (5 min)

1. Could you first tell me something about yourself?
   - Age
   - Gender
   - Marital status and household members
   - Occupation
   - Lived in community how long
2. Could you tell me around how many households there are in this village?
3. How much contact do you have with other community members outside your household?
   - Describe kind of contact
   - When and how often?
   - Where?

Development in the community (8-24 min)

With the next questions I try to get a picture on the main developments that happened in this community in the last three years.

4. If you think about the last few years, what would you consider the most important development in this community? (1-4 min)
   - Why?
   - What is your opinion on it?
   - Anything else?
5. Could you please describe how the income of your household had developed over the last three years? (1-3 min)
   - What reasons?
   - Same for other households?
6. And the consumption of your household, has this changed? (1-3 min)
   - Why?
   - And the prices of consumption?
7. Has your household incorporated any new technology in the last three years? This could be technologies used to ease your tasks in daily live or skills to increase production. (1-4 min)
   - When?
   - How did you know about it?
   - Have other households done this as well?
   - What is your opinion on it?
8. Have you noticed any changes in physical infrastructure within this area? (1-4 min)
   - If so, which?
   - When?
   - How come? Who was important?
   - What is your opinion?
   - Who benefits?
9. Were there any changes in the last years when it comes to social structure within the community? (1-4 min)
   - Why?
   - What is your opinion?
10. How is the welfare divided among households in this community? (2 min)
    - What is your opinion on it?
    - Has this changed?
11. Do you ever meet with other farmers to discuss information and ideas on farming? (Question added after interview 6)
    - What do you know from this?

LEAD project (8 min)

12. **If participant:** You are part of the LEAD project of BRAC. Can you shortly describe what this project did?
    - In what way has the project affected you?
    - Did you get a loan? What did you do with it?
    - Do you think you being in the project has affected other households as well?

13. **If not participating:**

In 2013, the NGO BRAC started a microfinance project, called LEAD: livelihood enhancement through agricultural development project, in among others this area. Have you heard about BRAC or the project?

    a. If yes:
- What do you know?
- From whom?
- Has this project in any way affected you? (for example in sales, new knowledge)
- What is your opinion on the project?

    b. If no:

      The project gives maize and poultry farmers training, organizes farmers' groups and gives them the possibility to borrow a loan. In the village … farmers had training and … of them received a loan.
- Have you noticed any changes among these farmers, for example in technique, welfare or consumption, community involvement?
- If so, what?
- Has this affected your household? Or others in community?
- What is your opinion a project like this?

Economic wellbeing (3 min)

14. On a scale of 1-5 where [READ CODES], In comparison to other community members, how would your household rank in economic well-being?

        1 = Significantly above average,

        2 = Above average,

        3 = Average wealth

        4 = Below average

        5 = Significantly below average

15. On a scale of 1-5 where [READ CODES]: When you think about three years ago, how would you rank your household in economic well-being, in comparison to other community members?
- Why has this chanced?

16. Overall, what do you think about the economic wellbeing in the community?

17. Do you have any (further) ideas that could help improve economic wellbeing in this community?

This was my last question. Do you have anything to add to the subjects we discussed?

Okay, thank you very much for your cooperation. I will use these interviews to study whether and in what way non-participants within the community are affected by microfinance activities. If you are interested in the results, I could send you a translated version of the main outcomes. Do you have any other questions?

8.4 Interview guide project officer

Hi, thank you for doing this interview. As I told before, I am doing an internship with BRAC in Dodoma to write my master thesis on the LEAD project, especially on the spillovers, so in what ways does the lead project affect the non-participants living in the same community. The last week, I have joined the enumerators here in Nyegezi to the farmers and I have conducted some additional interviews with participants and non-participants. But I would also like to know some more about how the project is implemented here in Nyegezi, so that is why I asked if I could interview you. It would be easiest to record our conversation on my mobile phone, so that I don't have to write everything down at this moment. Are you okay with this?

1. Could you first describe your job?
   - Worked for how long?

2. Can you describe what the LEAD project has done?
   - Training: how often, by who?
   - Loan: what use, who can get loan?
   - Input supply
   - Market access
   - Other aspects? How often group contact?

3. How where the participants selected?

4. What feedback did you get from the farmers?
   - Points to improve?
   - What happens if participants say they need something else?

5. As I told you before, my research is on spillover effects, so how can the LEAD project affect non-participants in the community. Do you think non-participants are affected?
   - In what ways?
   - Do you ever contact non-participants?
   - What are the possibilities of common investment from the LEAD project?

8.5 Codebook

Deductive codes

- Participant productivity
- Social capital
- Investment
- Household consumption
- Spillovers
    - Consumption spillovers
    - Joint investment
    - Input services
    - Knowledge spillovers

Inductive codes

- Change
    - Income
    - Social
    - Physical infrastructure
    - Techniques and technology
    - Other developments
- Info
    - Age
    - Household
    - Microfinance loan
    - Occupation
    - Years in community
- LEAD-project
    - Group formation
    - Effect
    - Knowledge non-participants
    - Opinion
- Researcher effects and requests
- Social engagement/volunteering
- Wellbeing

8.6 Do-file

```
sort farmer_type treat identifier appended
order identifier farmer_type treat appended
tsset identifier appended

tab treat appended
tab treat, nol
tab appended, nol

*Labels
label define noyes 0"No" 1"Yes"
label define average5 1"Significantly below average" 2"Below average" 3"Average" 4"Above
average" 5"Significanlty above average"
label define restypes 00"2014 Control" 01"2014 Treatment" 10"2016 Control" 11"2016 Treatment"
label define leadmeet 1 "Once a week" 2"Several times per week" 3"Every two weeks" 4"Monthly"
5"Less than once a month" 99"Don't know"
label define involve 1 "None" 2"Less than once month" 3"1-3 times a month" 4"1 or 2 times a week"
5"Multiple times a week" 6"At least every day" 99"Don't know" , modify
label define poular 0 "None" 1 "Chicken" 2"Eggs"
label define loan4cat 0 "No loan" 1 "1-300.000 TZS" 2 "300.001-500.000 TZS" 3 "More than 500.000
TZS"

label values s6a_8 involve
label values s6a_9 involve
label values s6a_10 involve

*Time and treatment
generate restype = treat + 10*appended
label values restype restypes
tab restype

*Create dummy training after time
tab treat, nol
tab appended, nol
generate training = treat * appended
label values training noyes
tab training restype

*Dummy loan after time & Loan value
tab financetk_loan appended // use this one
histogram financeloan_value
sum financeloan_value, detail
tab financeloan_value financetk_loan
generate loanvalue = financeloan_value
replace loanvalue = 0 if financetk_loan == 0
replace loanvalue = . if loanvalue == 999
replace loanvalue = . if loanvalue == 2
sum loanvalue, detail
tab loanvalue, missing
g logloan = log(loanvalue) // 0 niet in reg - categorien of 0=1?)
g logloan0 = log(loanvalue+0.01) // geen normale verdeling
```

```
histogram logloan
replace financeloan_value = . if financeloan_value == 999
replace financeloan_value = . if financeloan_value == 2
xtile loan3 = financeloan_value, nq(3)
gen loan4 = .
replace loan4 = loan3 if financetk_loan == 1
replace loan4 = 0 if financetk_loan == 0
label values loan4 loan4cat

*Economic wellbeing
tab save_borrowhh_scale
g wellbeing = .
replace wellbeing = 1 if save_borrowhh_scale == 5
replace wellbeing = 2 if save_borrowhh_scale == 4
replace wellbeing = 3 if save_borrowhh_scale == 3
replace wellbeing = 4 if save_borrowhh_scale == 2
replace wellbeing = 5 if save_borrowhh_scale == 1
tab wellbeing
label values wellbeing average5
tab wellbeing
tab wellbeing restype, col

gen wellbeing3 = wellbeing - 1
order wellbeing wellbeing3, after(save_borrowhh_scale)
replace wellbeing3 = 1 if wellbeing == 1
replace wellbeing3 = 3 if wellbeing == 5
label define average3 1"Below average" 2"Average" 3"Above average"
label values wellbeing3 average3
tab save_borrowhh_scale wellbeing3

*LEAD meetings - missings & quality
tab s6a_7, missing
label values s6a_7 leadmeet
tab s6a_7 restype, missing
gen leadmeetings = s6a_7
replace leadmeetings = . if s6a_7 == 99
replace leadmeetings = 1 if s6a_7 == 2
replace leadmeetings = 2 if s6a_7 == 1
label define leadmeetorder 1 "Several times per week" 2"Once a week" 3"Every two weeks"
4"Monthly" 5"Less than once a month" 6"Unknown", replace
label values leadmeetings leadmeetorder
tab s6a_7 leadmeetings, missing
replace leadmeetings = 6 if (restype == 11 & leadmeetings == .) // missing values groep
replace leadmeetings = . if (restype != 11) // control farmers niet in leadmeetings
tab leadmeetings restype, missing

gen leadmeetings4 = .
replace leadmeetings4 = 1 if leadmeetings == 1 | leadmeetings == 2
replace leadmeetings4 = 2 if leadmeetings == 3 | leadmeetings == 4
replace leadmeetings4 = 3 if leadmeetings == 5
replace leadmeetings4 = 99 if leadmeetings == 6
```

```
label define meet4 1"At least weekly" 2"1 or 2 times a month" 3"Less than once a month"
99"Unknown"
label value leadmeetings4 meet4
tab leadmeetings leadmeetings4, missing
replace leadmeetings4 = 0 if training == 0

*Collective sales - missings - not everyone sells? // not used yet
tab expensesselling_pdc farmer_type, missing
tab poul_salessell_ind_coll farmer_type, missing
tab poul_salesegg_ind_coll farmer_type, missing

by farmer_type, sort: tab expensesselling_pdc restype, missing // Why so many missing?
by farmer_type, sort: tab poul_salessell_ind_coll restype, missing
by farmer_type, sort: tab poul_salesegg_ind_coll restype, missing

*Community involvement
tab s6a_8, missing
tab s6a_9, missing
tab s6a_10, missing
replace s6a_8 = . if s6a_8 == 99
replace s6a_9 = . if s6a_9 == 99
replace s6a_10 = . if s6a_10 == 99
tab s6a_8 farmer_type, missing
gen meethelp = .
replace meethelp = 1 if s6a_8 == 1 | s6a_8 == 2
replace meethelp = 2 if s6a_8 == 3
replace meethelp = 3 if s6a_8 == 4 | s6a_8 == 5 | s6a_8 == 6
label define meethelpcat 1"Less than monthly" 2"1-3 times a month" 3"At least weekly"
label value meethelp meethelpcat
tab s6a_8 meethelp, missing

gen cominv = .
replace cominv = 1 if s6a_8 == 1
replace cominv = 2 if s6a_8 == 2 | s6a_8 == 3
replace cominv = 3 if s6a_8 == 4 | s6a_8 == 5 | s6a_8 == 6
label define cominvcat 1"Not" 2"Less than weekly" 3"At least weekly"
label value cominv cominvcat
tab s6a_8 cominv, missing

gen cominv4 = .
replace cominv4 = 0 if s6a_8 == 1
replace cominv4 = 1 if s6a_8 == 2
replace cominv4 = 2 if s6a_8 == 3
replace cominv4 = 3 if s6a_8 == 4 | s6a_8 == 5 | s6a_8 == 6
label value cominv4 meethelpcat
tab s6a_8 cominv4, missing

*Labour costs - hiring labour costs maize/poultry
sum mprod_hiring_labour, detail
histogram mprod_hiring_labour
sum cost_pol_pdnhiring_labour2, detail
histogram cost_pol_pdnhiring_labour2
```

```
rename mprod_hiring_labour labourmaize
rename cost_pol_pdnhiring_labour2 labourpoultry
generate labour = .
replace labour = labourmaize if farmer_type == 1
replace labour = labourpoultry if farmer_type == 2
mean labour, over(farmer_type)

*Midline labour - if costs_array = "personel" | costs_arry = "number"unit price>=
generate q1 = quantity_used_maize_1
generate q2 = quantity_used_maize_2
generate q3 = quantity_used_maize_3
generate q4 = quantity_used_maize_4
generate q5 = quantity_used_maize_5
generate q6 = quantity_used_maize_6
generate q7 = quantity_used_maize_7
order q1, before(quantity_used_maize_1)
order q2, before(quantity_used_maize_2)
order q3, before(quantity_used_maize_3)
order q4, before(quantity_used_maize_4)
order q5, before(quantity_used_maize_5)
order q6, before(quantity_used_maize_6)
order q7, before(quantity_used_maize_7)
replace quantity_used_maize_1 = q1 / unit_price_maize_1 if q1 >= unit_price_maize_1
replace quantity_used_maize_2 = q2 / unit_price_maize_2 if q2 >= unit_price_maize_2
replace quantity_used_maize_3 = q3 / unit_price_maize_3 if q3 >= unit_price_maize_3
replace quantity_used_maize_4 = q4 / unit_price_maize_4 if q4 >= unit_price_maize_4
replace quantity_used_maize_5 = q5 / unit_price_maize_5 if q5 >= unit_price_maize_5
replace quantity_used_maize_6 = q6 / unit_price_maize_6 if q6 >= unit_price_maize_6
replace quantity_used_maize_7 = q7 / unit_price_maize_7 if q7 >= unit_price_maize_7
//one case changed by hand

generate labourmaize2016 = .
replace labourmaize2016 = 0 if !missing(costs_array_1)
replace labourmaize2016 = quantity_used_maize_1 * unit_price_maize_1 if costs_array_1 == "Hiring
labour"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_2 * unit_price_maize_2 if
costs_array_2 == "Hiring labour"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_3 * unit_price_maize_3 if
costs_array_3 == "Hiring labour"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_4 * unit_price_maize_4 if
costs_array_4 == "Hiring labour"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_5 * unit_price_maize_5 if
costs_array_5 == "Hiring labour"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_6 * unit_price_maize_6 if
costs_array_6 == "Hiring labour"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_7 * unit_price_maize_7 if
costs_array_7 == "Hiring labour"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_1 * unit_price_maize_1 if
costs_array_1 == "kuajili wafanyakazi"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_2 * unit_price_maize_2 if
costs_array_2 == "kuajili wafanyakazi"
```

```
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_3 * unit_price_maize_3 if
costs_array_3 == "kuajili wafanyakazi"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_4 * unit_price_maize_4 if
costs_array_4 == "kuajili wafanyakazi"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_5 * unit_price_maize_5 if
costs_array_5 == "kuajili wafanyakazi"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_6 * unit_price_maize_6 if
costs_array_6 == "kuajili wafanyakazi"
replace labourmaize2016 = labourmaize2016 + quantity_used_maize_7 * unit_price_maize_7 if
costs_array_7 == "kuajili wafanyakazi"
mean labourmaize2016, over(restype)
mean labourmaize2016, over (farmer_type)

generate labourpoultry2016 = .
replace labourpoultry2016 = 0 if !missing(costsp_array_1)
replace labourpoultry2016 = quantity_used_poultry_1 * unit_price_poultry_1 if costsp_array_1 ==
"Hiring labour"
replace labourpoultry2016 = labourpoultry2016 + quantity_used_poultry_2 * unit_price_poultry_2 if
costsp_array_2 == "Hiring labour"
replace labourpoultry2016 = labourpoultry2016 + quantity_used_poultry_3 * unit_price_poultry_3 if
costsp_array_3 == "Hiring labour"
replace labourpoultry2016 = labourpoultry2016 + quantity_used_poultry_4 * unit_price_poultry_4 if
costsp_array_4 == "Hiring labour"
replace labourpoultry2016 = labourpoultry2016 + quantity_used_poultry_5 * unit_price_poultry_5 if
costsp_array_5 == "Hiring labour"
replace labourpoultry2016 = labourpoultry2016 + quantity_used_poultry_6 * unit_price_poultry_6 if
costsp_array_6 == "Hiring labour"

replace labourmaize = labourmaize2016 if appended == 1
replace labourpoultry = labourpoultry2016 if appended == 1
replace labour = labourmaize if farmer_type == 1
replace labour = labourpoultry if farmer_type == 2
generate labour2016 = labourmaize2016 if farmer_type == 1
replace labour2016 = labourpoultry2016 if farmer_type == 2
replace labour = . if labour == 99 | labour == 999
replace labour2016 = . if labour2016 == 99 | labour2016 == 999
gen labourval = labour if labour != 0
xtile labour4 = labourval, nq(3)
tab labour labour4, missing
replace labour4 = 0 if labour == 0
label define labour4cat 0 "No labour" 1"1 - 25000 TZS" 2"25001 - 50000 TZS" 3"Over 50000 TZS"
label value labour4 labour4cat
xtile labour2016cat = labour2016, nq(4)
tab labour2016 labour2016cat, missing

*Control variables
tab branch, missing
tab branch restype, missing
replace branch = 1 if (branch_new == "Tegeta" & appended == 1)
replace branch = 2 if (branch_new == "Korogwe" & appended == 1)
replace branch = 3 if (branch_new == "Machame" & appended == 1)
replace branch = 4 if (branch_new == "Mwika" & appended == 1)
```

```
replace branch = 5 if (branch_new == "Manyoni" & appended == 1)
replace branch = 6 if (branch_new == "Bububu" & appended == 1)
replace branch = 7 if (branch_new == "Nyegezi" & appended == 1)
replace branch = 8 if (branch_new == "Bunda" & appended == 1)
replace branch = 9 if (branch_new == "Ruaha" & appended == 1)
replace branch = 10 if (branch_new == "Gallapo" & appended == 1)
tab branch appended, missing
replace branch = 9 if (branch_new == "" & appended == 1)

by appended, sort: sum hh_land_size, detail
tab hh_land_size restype, missing
replace hh_land_size = . if hh_land_size == 99
xtile land3 = hh_land_size, nq(3)
label define land3cat 1 "1 or less" 2"1.01-3" 3"more than 3"
label value land3 land3cat
sort farmer_type treat identifier appended
gen land14 = land3 if appended == 0
replace land14 = land3[_n-1] if appended == 1
label value land14 land3cat
tab land14 restype, missing

by appended, sort: sum s3_1e, detail // land for free
tab s3_1e restype, missing
replace s3_1e = . if s3_1e >= 100 // no baseline so not used

sum traininghh_pol_exp, detail
by farmer_type, sort: tab traininghh_pol_exp restype, missing
by farmer_type, sort: tab tt_exp_maize_gro restype, missing
rename traininghh_pol_exp experiencepoultry
rename tt_exp_maize_gro experiencemaize
generate experience = .
replace experience = experiencepoultry if farmer_type == 2
replace experience = experiencemaize if farmer_type == 1
mean experience, over(appended)

//create gender
sort farmer_type treat identifier appended
tab s2_3_1 restype
gen gender = s2_3_1
replace gender = gender[_n+1] if missing(gender)
tab gender restype
label define sex 0"Female" 1"Male"
label value gender sex

//create age
mean s2_4_1, over(restype)
gen age = s2_4_1
replace age = age[_n+1] - 2 if missing(s2_4_1)
mean age, over(restype)
histogram age

*Regression 1a - production: harvest=b1time+b2timetraining+b3loan+b4controlvar+b5 - not used
```

//by farmer_type, sort: ologit production appended treat training
//by farmer_type, sort: ologit production appended treat training loanvalue
//by farmer_type, sort: ologit production appended treat training loanvalue i.branch hh_land_size experience
//by farmer_type, sort: ologit production appended treat training financetk_loan loanvalue i.branch hh_land_size experience

*Regression 1 - wellbeing
tab wellbeing, missing
tab wellbeing3
tab wellbeing3 restype

ologit wellbeing3 appended training loanvalue
ologit wellbeing3 appended training loanvalue farmer_type
by farmer_type, sort: ologit wellbeing3 appended treat training
by farmer_type, sort: ologit wellbeing3 appended treat training i.loan4
by farmer_type, sort: ologit wellbeing3 appended treat training i.loan4 i.land14 i.branch gender age
by farmer_type, sort: ologit wellbeing3 appended treat i.land14 i.branch gender age
by farmer_type, sort: ologit wellbeing3 appended treat training financetk_loan i.branch // use loan binary?

by farmer_type, sort: ologit wellbeing3 appended treat training, vce (cluster identifier)
by farmer_type, sort: ologit wellbeing3 appended treat training i.loan4, vce (cluster identifier)
by farmer_type, sort: ologit wellbeing3 appended treat training i.loan4 i.land14 i.branch gender age, vce (cluster identifier)
by farmer_type, sort: ologit wellbeing3 appended treat i.land14 i.branch gender age, vce (cluster identifier)

Regression 2 - Social capital effects on wellbeing change
by farmer_type, sort: ologit wellbeing3 appended treat i.leadmeetings4
by farmer_type, sort: ologit wellbeing3 appended treat i.leadmeetings4 i.loan4 i.land14 i.branch gender age

by farmer_type, sort: ologit wellbeing3 appended treat i.leadmeetings4, vce (cluster identifier)
by farmer_type, sort: ologit wellbeing3 appended i.leadmeetings4 i.loan4 i.land14 i.branch gender age, vce (cluster identifier)

*Regression 3a - Labour hiring (big differences: both or midline only?) // check midline only - maize only
by farmer_type, sort: ologit labour4 appended treat training
by farmer_type, sort: ologit labour4 appended treat training i.loan4
by farmer_type, sort: ologit labour4 appended treat training i.loan4 i.land14 i.branch gender age
by farmer_type, sort: ologit labour4 appended treat i.land14 i.branch gender age

by farmer_type, sort: ologit labour4 appended treat training, vce (cluster identifier)
by farmer_type, sort: ologit labour4 appended treat training i.loan4, vce (cluster identifier)
by farmer_type, sort: ologit labour4 appended treat training i.loan4 i.land14 i.branch gender age, vce (cluster identifier)
by farmer_type, sort: ologit labour4 appended treat i.land14 i.branch gender age, vce (cluster identifier)

*Regression 3b - Community involvement (midline only):

```
by farmer_type, sort: ologit meethelp treat
by farmer_type, sort: ologit meethelp treat i.loan4
by farmer_type, sort: ologit meethelp treat i.loan4 i.branch gender age
by farmer_type, sort: ologit meethelp i.branch gender age

by farmer_type, sort: ologit cominv4 treat
by farmer_type, sort: ologit cominv4 treat i.loan4
by farmer_type, sort: ologit cominv4 treat i.loan4 i.branch gender age

gen iloan414 = loan4 if appended == 0
replace iloan414 = 0 if appended == 1
gen iloan4 = appended*loan4
by farmer_type, sort: ologit wellbeing3 appended treat training i.iloan414 i.iloan4 i.land14 i.branch
gender age, vce (cluster identifier)

*Make wide data - different files
keep if appended == 0 // save baseline
keep if appended == 1 // save midline

//midline file
rename * m*
rename midentifier identifier

//baseline file
merge 1:1 identifier using "C:\Users\Wendy\Dropbox\1. Microfinance\Data\Survey\1. Midline.dta",
nogenerate
tab treat mtreat
//save as 0.Wide data

gen chwellbeing = mwellbeing - wellbeing
tab chwellbeing, missing
tab chwellbeing treat, col
gen chwb = chwellbeing
replace chwb = -1 if chwellbeing == -2 | chwellbeing == -3
replace chwb = 1 if chwellbeing == 2 | chwellbeing == 3
replace chwb = chwb + 2
tab chwellbeing chwb, missing

gen chloan = mloanvalue - loanvalue
sum chloan, detail
gen chloan5 = .
replace chloan5 = 4 if chloan < 0
replace chloan5 = 0 if chloan == 0
replace chloan5 = 1 if inrange(chloan, 1, 300000)
replace chloan5 = 2 if inrange(chloan, 300001, 500000)
replace chloan5 = 3 if chloan > 500000
label value chloan5 loan4cat
tab chloan chloan5, missing

*Wide data regressions*
*RQ1
by farmer_type, sort: ologit chwb treat
```

by farmer_type, sort: ologit chwb treat i.mloan4
by farmer_type, sort: ologit chwb treat i.mloan4 i.land14 i.branch gender age
by farmer_type, sort: ologit chwb i.land14 i.branch gender age

*RQ2
by farmer_type, sort: ologit chwb i.mleadmeetings4
by farmer_type, sort: ologit chwb i.mleadmeetings4 i.mloan4 i.land14 i.branch gender age

*RQ3
by farmer_type, sort: ologit mlabour4 labour4 treat
by farmer_type, sort: ologit mlabour4 labour4 treat i.mloan4 i.branch
by farmer_type, sort: ologit mlabour4 labour4 treat i.mloan4 i.land14 i.branch gender age
by farmer_type, sort: ologit mlabour4 labour4 i.land14 i.branch gender age
by farmer_type, sort: ologit mlabour4 labour4 i.mleadmeetings4
by farmer_type, sort: ologit mlabour4 labour4 i.mleadmeetings4 i.mloan4 i.branch
by farmer_type, sort: ologit mlabour4 labour4 i.mleadmeetings4 i.mloan4 i.land14 i.branch gender age

by farmer_type, sort: ologit mcominv4 treat
by farmer_type, sort: ologit mcominv4 treat i.mloan4
by farmer_type, sort: ologit mcominv4 treat i.mloan4 i.land14 i.branch gender age
by farmer_type, sort: ologit mcominv4 i.land14 i.branch gender age
by farmer_type, sort: ologit mcominv4 i.mleadmeetings4
by farmer_type, sort: ologit mcominv4 i.mleadmeetings4 i.mloan4
by farmer_type, sort: ologit mcominv4 i.mleadmeetings4 i.mloan4 i.land14 i.branch gender age