



الشمولية والكفاءة في مؤسسات التمويل الصغير في الاقتصاد الفلسطيني

*Outreach and Efficiency of the Microfinance Institutions in
the Palestinian Economy*

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June, 2016



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Dedication

This thesis is dedicated to my husband, Ayman, who has been a constant source of support and encouragement during the challenges of graduate school and life. I am truly thankful for having you in my life. This work is also dedicated to my father (Yousef), my mother (Mariam), my father in law (Sami), and my mother in law (Sawsan), who have always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve. To my sisters and brothers, friends, teachers, and colleagues who support me in every step in my life.

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Abstract

This study investigates the outreach and cost efficiency of seven microfinance institutions operating in the Occupied Palestinian Territories, for the period 1999-2014 using Stochastic cost frontier. The efficiency is estimated according to the following variables: legal form of MFIs, MFIs size, focus of MFIs on lending females, and grants status. Determining the cost efficiency of MFIs will concentrate efforts to enhance this efficiency, and to locating the different problems facing the microfinance institutions. This will help them to avoid these problems in the future and improve MFIs operations. Additionally, finding the nature of outreach- efficiency relationship will help MFIs to know the effects of their trial to achieve social goals on their financial goals and sustainability. Subsequently, taking the appropriate actions to achieve the social and financial goals and eliminate the negative effects of each goal on the other (if found).

The results show that the average cost efficiency is 96.4% with a downward trend during the period. Furthermore, results show that UNRWA has the highest cost efficiency scores, followed by institutions with legal form of Non-Bank Financial Institution (NBFIs), while Non-Governmental Organizations (NGOs) show the lowest cost efficiency. Larger MFIs are more cost efficient than smaller ones. The average cost efficiency for MFIs that focus on lending females is less than other MFIs. Finally, MFIs that do not consider grants as main sources of funding are less cost efficient than MFIs that mainly depend on grants to finance their operations.

The analysis of outreach-efficiency relationship shows that there is a trade-off between outreach (measured by percentage of females' borrowers) and cost efficiency. Other variables that have significant impact on MFIs cost efficiency are included in this study; those variables include debt to equity ratio (DER), where high DER has a negative effect on cost efficiency. The study also finds that newer MFIs are more efficient than the older ones. Finally, loan loss rate (LLR) has no significant impact on MFIs cost efficiency.

ملخص

تبحث هذه الدراسة في الشمولية وكفاءة التكاليف لمؤسسات التمويل الصغير العاملة في الأراضي الفلسطينية المحتلة، وذلك باستخدام بيانات تم تجميعها من سبع مؤسسات قامت بتقديم خدمات التمويل الصغير خلال الفترة من 1999-2014. واستخدمت الدراسة منهجية تحليل الحدود العشوائية لتقدير دالة التكاليف الكلية لهذه المؤسسات. قامت الدراسة بتقدير كفاءة التكاليف بناء على المتغيرات التالية؛ الشكل القانوني للمؤسسات التمويل الصغير، وحجم مؤسسات التمويل الصغير، والتركيز على إقراض الإناث، ومدى قبولها للمنح. لا شك أن تحديد كفاءة التكاليف في مؤسسات التمويل الصغير يساعد على تركيز الجهود لتعزيز هذه الكفاءة، بالإضافة إلى تحديد المشاكل التي من الممكن أن تواجه هذه المؤسسات، وبالتالي تجنب هذه المشاكل مستقبلاً. بالإضافة إلى أن تحديد العلاقة بين الشمولية والكفاءة يساعد على معرفة أثر كل منهما على الآخر، وبالتالي اتخاذ الإجراءات المناسبة لتجنب الأثر السلبي لكل منهما على الآخر (إن وجد).

تشير نتائج الدراسة إلى أن متوسط كفاءة التكاليف بلغ حوالي 96.4% خلال فترة الدراسة، وأن الاتجاه العام لهذه الكفاءة يتناقص مع مرور الزمن. كما أظهرت النتائج أيضاً أن الأونروا، كمؤسسة تمويل صغير، لديها أعلى درجات الكفاءة، تليها المؤسسات المالية غير المصرفية، متبوعة بالمنظمات غير الحكومية التي أظهرت أقل نسبة كفاءة. كما تشير النتائج إلى أن المؤسسات الأكبر حجماً أظهرت كفاءة أكبر من المؤسسات الأصغر. بالإضافة إلى ذلك، فإن متوسط كفاءة التكاليف لمؤسسات التمويل الصغير التي تركز على إقراض النساء أقل من متوسط الكفاءة للمؤسسات الأخرى. وأخيراً، وجدت الدراسة أن المؤسسات التي لا تعتبر المنح من المصادر الرئيسية للتمويل أقل كفاءة من المؤسسات التي تعتمد على المنح لتمويل عملياتها.

بالنسبة لطبيعة العلاقة بين الشمولية والكفاءة لهذه المؤسسات، تشير نتائج الدراسة أنه كلما زادت الشمولية (تقاس بنسبة النساء المقترضات) قلت الكفاءة. وحللت الدراسة أيضاً المتغيرات الأخرى التي من الممكن أن تؤثر على كفاءة التكاليف. ومن ضمن هذه المتغيرات؛ نسبة الدين إلى حقوق الملكية، حيث تظهر النتائج أنه كلما زادت هذه

النسبة، قلت الكفاءة. وأظهرت نتائج الدراسة أيضاً أن مؤسسات التمويل الأحدث تكون في العادة أكثر كفاءة من المؤسسات الأقدم. وأخيراً، فإن معدل خسائر القروض لا يوجد لها تأثير يذكر على كفاءة التكاليف.

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Chapter One: Framework of the Study

This chapter presents the framework of the study. It consists of seven sections; Section one provides an introduction; section two illustrates the problem statement; section three states the objectives; section four illustrates the importance of the study and the stakeholders, whom this study could benefit; section five illustrates the methodology, the variables, and the data sources; Section six lists the limitations; and, section seven describes the contents of the study.

1.1 Introduction

A recent trend toward economic empowerment of the poor, especially poor females, has evolved. And since poverty alleviation became the focus point of many international organizations, such as World Bank and other United Nations agencies (Yanagihara, 2003), the role of Microfinance Institutions (MFIs) has evolved, because they provide financial support to poor and low-income households. MFIs target a sector that lacks sufficient collateral or credit history and thus has no access to regular banking. Consequently, MFIs bear the risk and cost associated with lending unsecured loans to poor borrowers who were excluded from the regular banking system (Khawari, 2004).

There are few successful stories of microfinance experience in developing countries. For example, the Grameen Bank in Bangladesh established by Muhammad Younes, grants collateral-free loans to poor villagers in Chittagong. This bank focuses on group lending as a self-insurance mechanism, and as a way to guarantee loans repayment (Khawari, 2004). The success of this mechanism is reflected in high recovery rate of 98.28% as of March 2015¹. Grameen Bank abandoned the donor funds and started to finance itself by its own fund and the depositors' funds (Grameen Bank, 2015).

According to Grameen Bank's latest reports in March 2015, the cumulative amount of loans granted since the inception of Grameen Bank has amounted to USD 1.68 billion; loans amounting to USD 1.53 billion were repaid from granted loans since inception. The bank's total number of borrowers reached around 8.66 million in March 2015; 96.22% of them are female borrowers. The Grameen Bank recently provides housing, education, agriculture, and auto loans (Grameen Bank, 2015).

In the Palestinian context, 25.8% of Palestinian families in the Occupied Palestinian Territory (OPT) are under poverty line, and 12.9% are in extreme poverty (PCBS, 2011). Moreover, the unemployment rate in the OPT has reached 24.8%, while the females unemployment rate has reached 38.9% in the second quarter of 2015 (PCBS, 2015).

¹ The recovery rate refers to the extent to which the loan principal and its accrued interest are due on a defaulted debt, were recovered by the lender (Mora, 2012).

The Palestinian economy is volatile due to the unstable political conditions. Therefore, the regular banks avoid providing credit to a large segment of the Palestinian people due to the lack of sufficient collaterals and the high risk of default. Thus, MFIs have a high potential to alleviate poverty and to improve the standards of living for a large segment of the poor in the OPT.

1.2 Problem Statement

This study examines the relationship between the depth of outreach and the cost efficiency for MFIs in OPT. It is motivated to provide an answer to the following question: How are the outreach and efficiency goals of MFIs operating in the Palestinian economy related?

Furthermore, the following sub-questions needs to be answered:

- 1- Are MFIs operating in the OPT fully efficient?
- 2- Does the efficiency of the MFIs in the OPT increase, decrease, or remain unchanged during the period of the study?
- 3- Does the focus on lending females have an effect on MFIs efficiency? If so, what is the direction of this effect?
- 4- Does serving low-income clients have an effect on the efficiency of the MFIs? If so, what is the direction of this effect?
- 5- Does the level of efficiency differ according to the legal form of the MFIs (NGOs, Non-Bank Financial Institution, Other)?

- 6- Do the differences in subsidies levels (grants), size, and age affect the efficiency of MFIs in the OPT?
- 7- Does the degree of financial leverages and the loan loss rates have an impact on MFIs cost efficiency?

1.3 Objectives

The main objective of this study is to investigate the cost efficiency of MFIs operating in the OPT and how this efficiency is related to the outreach. Moreover, the specific objectives to be achieved are:

- 1- To find out whether MFIs operating in the OPT have some degree of inefficiency, and to detect the direction of the efficiency of MFIs during the study period.
- 2- To analyze cost efficiency in terms of legal form of, size, focus on female lending, and grants status.
- 3- To find out the effect of outreach on MFIs efficiency.
- 4- To detect the effects of debt to equity ratio, loan loss rates, and MFIs age on MFIs efficiency.
- 5- To Suggest recommendations according to the findings of this study, which may benefit MFIs and PMA.

1.4 Importance

Determining the cost efficiency scores for MFIs will concentrate the efforts of MFIs and PMA to enhance this efficiency. This increases the size of the loans portfolios offered by these institutions and improves their role in economic development. Furthermore, this study helps PMA to locate different problems facing MFI and helping them to avoid these problems in the future and improve MFIs operations.

In addition, finding the nature of outreach - efficiency relationship helps MFIs to assess the social goals achieved and their impact on their financial performance and sustainability. Finally, this study fills the literature gap of outreach-efficiency relationship for MFIs operating in the OPT.

1.5 Methodology

In order to answer its questions, the study illustrates how SFA evaluates the outreach - efficiency of MFIs in the OPT.

This study contains two interrelated models. The first model estimates the total cost frontier, using financial and operating costs as input prices, and gross loan portfolio as an output. The second model examines the effects of the depth of outreach on MFIs efficiency. The depth of outreach is measured by the percentage of the female borrowers, and average loan balance per borrower. Other variables include debt to equity ratio, loan loss rates, age of MFIs, levels of subsidies received by MFIs, and size of MFIs are included, to find out the possible sources of inefficiency.

The data required for this study are obtained from MixMarketTM (a global web-based microfinance information platform), and the annual reports and audited financial statements of MFIs operating in the OPT.

1.6 Limitations

The major difficulty faced completing this study is the lack of cooperation from MFIs working in the OPT to disclose their data. This has limited the number of observations which affects the SFA estimation, where the more data available, the better the estimation and the more accurate and realistic results.

Another difficulty is the scarcity of data, especially data on the exact amount of gross loans portfolio granted to clients from urban and rural areas. This has reduced the number of outreach variables since lending people in poorer rural areas reflects a more depth of outreach compared to lending people in urban areas, where the overall poverty in urban areas is less than rural ones. Furthermore, MFIs dependence on donations and soft loans for financing creates a problem on the cost frontier specification. That is because the variable of financial costs is excluded from model, due to the estimation problems resulted from the low value of the financial cost, if compared to the operating cost of these institutions.

The lack of data on the operating costs types (personnel and administrative costs) makes it hard to calculate input prices. Therefore, the study uses total operating costs to find the price of labor. Furthermore, the operating cost variable is taken as a proxy

of labor price, since dividing the operating cost on the number of personnel to calculate the labor price creates estimation problem. Moreover, the nature of data (unbalanced panel data) does not allow to perform stationarity tests, because these tests require a strongly balanced data. Finally, there are many financial and technical limitations that limit the use of more advanced computer programs specialize in estimating the stochastic frontier function (like FRONTIER).

1.7 Contents

This study is organized as follows: Chapter one contains the introduction, problem statement, objectives, importance of the study, methodology, limitations, and contents. Chapter two presents the theoretical background of microfinance: an overall view of finance to poor, microfinance definition, the impact of microfinance on economic development and females' empowerment, the triangle of microfinance, and introduction to outreach and efficiency of MFIs, and the literature review. Chapter three introduces the microfinance in the OPT. Chapter four illustrates the theoretical framework; which contains a full description of the research methodology, variables of the total cost frontier, and variables of the cost inefficiency model. Furthermore, chapter four describes the variables used. Chapter five discusses the empirical results and findings. Chapter six presents the conclusion, and recommendations.

Chapter Two: Theoretical Background and Literature Review

This chapter consists of two sections; the first section introduces the theoretical background of microfinance industry, including finance to poor, the development of microfinance, role of microfinance in the economic development and in encouragement of females' empowerment, the emergence of microfinance triangle concept, and finally the outreach and the efficiency of MFIs. The second section contains literature review; which illustrates different empirical and applied studies of MFIs efficiency and its relationship with outreach, in different countries and at different periods.

2.1 Theoretical Background

This section is a detailed discussion of theoretical background of microfinance concept.

2.1.1 Finance to the Poor

Since the last few decades, the goals of World Bank (WB), and the International Monetary Fund (IMF) have converged on poverty reduction. These goals emerged due to the increased awareness of the negative effects of poverty on nation's

development (Yanagihara, 2003). Many poverty reduction schemes were adopted by WB and IMF, to achieve the poverty reduction goals².

Furthermore, awareness towards the role of investment, both the private and the public investment, in poverty alleviation has emerged, particularly in the developing countries, which usually have a specific sector, like agriculture, that has the most power to reduce poverty (Timmer, 1997).

A question arises here; what are the sources of funds that are needed for investment? In the developing countries, the poverty rates are high, and a significant proportion of the population in these countries is poor. This includes females who are living in rural areas of these countries and represent a high percentage of underutilized labor force. Indeed, the poor in these countries will not spend their few and insufficient money on investment, or probably they do not have the needed money for investment. Therefore, the micro credit and microfinance institutions have emerged, in order to help poor people who were excluded from the formal lending, to move out of poverty.

2.1.2 Definition of Microfinance

There are many definitions of microfinance. Schreiner and Colombet (2001) define microfinance as “the attempt to improve the access to small deposit and small loan for poor households neglected by banks”. Mix Market (2015) defines microfinance

² These schemes include the Poverty Reduction Strategic Paper “PRSP”, and the Comprehensive Development Framework “CDF”.

as: “Microfinance services – as opposed to financial services in general – are retail financial services that are relatively small in relation to the income of a typical individual. Specifically, the average outstanding balance of microfinance products is no greater than 250% of the average income per person (GNI per capita)” (Mix Market, 2015).

Microfinance concept has evolved from providing micro loans to low income households to an umbrella that contains providing several and broad financial services, like providing demand deposit services to encourage individual savings, providing micro credit loans for households and small entrepreneurs, insurance, and money transfer services (Sharma, 2001). MFIs focus mainly on providing these financial services for poor and near poor clients (Rosenberg et.al., 2004).

2.1.3 Microfinance Impact on the Economic Development

There is a continuous debate about the role of microfinance in the economic development. Proponents and the opponents of microfinance have various explanations for their attitude toward the role of microfinance in the economic development.

From proponents point of view, Otero (1999) argues that microfinance provides a financial capital for the poor, which works in alignment with the human and social capital (e.g. education and training), in order to resist poverty.

In 2000, the United Nations conducted the Millennium Summit, which set out a series of time-bound targets that have become known as: “The Millennium Development Goals (MDGs)”. The eight MDGs are: eradicate Extreme Hunger and Poverty; achieve Universal Primary Education; promote Gender Equality and Empower Females; reduce Child Mortality; improve Maternal Health; combat HIV/AIDS, Malaria and other diseases; ensure environmental sustainability; and develop a Global Partnership for Development (MDGs report, 2015).

A deeper insight of the MDGs shows that these goals include various aspects of nations’ economic development such as: nutrition, education, health, and gender equity (Littelfield et.al., 2003). Microfinance proponents such as Littelfield et.al. (2003) and Simanowitz and Brody (2004), emphasized the role of microfinance in achieving MDGs. The microfinance impact goes beyond the business investment into social investment, because the microfinance services provided to the poor help them in enhancing the standards of living.

The opponents of microfinance role in economic development suggest that microfinance does not provide a magical solution to the poverty problem; it even could make the poverty worse-off (Hulme and Mosley, 1996). One reason of why microfinance does not provide a radical solution for poverty, from their point of view, is that the microfinance attracts the poor but not the “poorest” (Simanowitz, 2000). In other words, MFIs attract “richer” poor who can afford to take larger amount of loans, and definitely have lower default risk than the poorest.

Another reason for not considering a big role of microfinance in economic development is that microfinance loans create a big and heavy debt upon the poor families (Buss, 1999). The poor are the most negatively affected by vulnerable economic conditions. Besides, lack of appropriate infrastructure needed to conduct the business successfully, in addition to the great competition from businesses providing similar products and services, lack of financial and managerial training and schooling, and other factors that could make the poor worse off if they started businesses from microfinance loans under these conditions (Swope, 2007). This occurs because any business starts to work at this situation have a great probability of failure. Therefore, poor people who depend on microfinance loans will bear an additional burden, resulted from repaying the debt that they had taken to start business and fail. The result is a greater poverty in the society (Swope, 2007).

2.1.4 Microfinance Impact on the Females' Empowerment

Statistics of many MFIs worldwide reveal the fact that females represent the majority of MFIs clients (Swope, 2007). Indeed, females' enterprises are less likely to succeed and achieve the target and desired return than men's, because females invest in more safe, less profitable businesses, while men usually prefer higher return (and therefore a higher risk enterprises), like retail and manufacturing industries (Javier, 2004).

The importance of focusing on providing credit to females is to save the societies from gender discrimination effects, which resulted from treating females as second class citizens. This gender discrimination definitely results in a higher poverty and

lower standards of living in these societies (Cheston and Kuhn, 2002). Families where females contribute in their income, usually have a higher and better educational level, better nutrition and more healthy children (Cheston and Kuhn, 2002). This will improve the standards of living and reduce the poverty in the societies giving females the chance to be entrepreneurs and start their own businesses.

Why would microfinance increase females' empowerment? Traditionally, females are in a lower social class than men because of the lack of economic and financial opportunities to start an enterprise and generate income, and because of the low participation of females in the public life (Swope, 2007). Microfinance provides females the opportunity to enhance their status in the society by generating income and give the females the opportunity to control their businesses and lives (Cheston and Kuhn, 2002). This could happen indirectly by providing females the sufficient training, awareness and financial literacy to face the existing norms and the cultural challenges in the society, which place them into inferior class of men (Cheston and Kuhn, 2002). As a result, females will be given the opportunity to control their businesses and lives (Mosedule, 2003).

However, does greater access of females to credit leads to females' empowerment automatically? Cheston and Kuhn (2002) listed several factors that affect this empowerment and the transformation in females' lives, some factors are related to individuals skills, abilities and literacy, others related to the local environment

surrounding these females, all of these factors may cooperate to prevent the females empowerment despite of the existence of credit.

2.1.5 The Triangle of Microfinance

During the 1990s, the International Food Policy Research Institute (IFPRI) supported a survey that aimed to clarify the conditions in which state investment in microfinance programs will help in improving the life of poor people, this survey led to the emergence of the concept: “The Triangle of Microfinance” (Zeller and Meyer, 2003). In each angle of this triangle there is a goal, and the MFIs should try to achieve all of them simultaneously in order to achieve high performance. These three vital objectives are: outreach to the poor, financial sustainability, and their impact (Zeller and Meyer, 2003).

The outreach indicates the number of clients served by MFI. The definition of outreach is broad and consist of different dimensions, such as the number of females served, the variety of financial services (Meyer, 2002), and the average loan balance for borrower (Hermes et.al., 2011). All these dimensions of outreach should reflect the main goal of MFIs of helping the poor to improve their standards of living and start their own business.

The second objective is achieving the financial sustainability. Zeller and Meyer (2003) define it as “meeting operating and financial cost over the long term”. In other

words, the MFIs should try to achieve two levels of sustainability: operational and financial self-sustainability (Meyer, 2002). The operational level means the ability of MFIs to cover the operating cost by the operating income, while the financial level includes -besides covering the operating costs- the ability to cover the financial expense like interest expense and other costs of fund (Meyer, 2002).

A higher third level of sustainability that could be achieved by MFIs is the institutional sustainability. At this level, the MFI can build its own capital resources, therefore it no longer needs the donors' grants and/or soft loans (Kimando et.al., 2012).

The last objective is the welfare impact, which is the most difficult and the least accurate goal to measure, because the welfare impact indicates to what extent the microfinance funding affects the quality of life of borrowers (Zeller and Meyer, 2003). In other words, do microfinance programs help poverty alleviation? Or, what are the consequences of microfinance loans granted to poor people in improving the education, nutrition, school enrollment rate, general health and other quality of life aspects? In fact, measuring the welfare impact of microfinance is mainly measuring the magnitude of social and economic development of microfinance clients, especially the poor ones, which indeed is not an easy task.

2.1.6 Outreach and Efficiency of MFIs

The nature of the relationship between the first objective of MFIs (outreach), and the second objective (financial sustainability and efficiency) is a subject of debate. Many studies investigated the issue of outreach-efficiency relationship in MFIs. Some of these studies found that higher outreach is associated with higher efficiency; others found that the trade-off is existed in outreach-efficiency relationship (Hermes et.al., 2011). These findings differ according to many factors; the country where the MFIs studied are operating, the time period, and other factors related to the nature of MFIs in each study.

Before moving to showing the applied studies in this issue, many explanations will be placed here to construe the differences in outcomes in these studies. There are many explanations of why the outreach and efficiency are complementary objectives. A possible explanation is that increasing outreach will help the MFI to achieve economies of scale, and reduce the costs, hence the sustainability will also be achieved (Meyer, 2002).

In the case of trade-off between outreach and efficiency, some explanations could provide logical reasons. For instance, the transaction cost of granting loans, especially the fixed cost per loan, for a small loans is as high as for large loans, making the process of issuing small loans is costly if compared to return obtained from them, and the MFIs will be discouraged to grants loans to poor and prefer wealthier borrowers, so less outreach will be achieved (Hermes et.al., 2011).

The outreach-sustainability relationship is affected by several factors and market situations such as; the increased competition between MFIs operating in the market, the adoption of new technological technique by MFIs to increase the efficiency and to reduce the costs, the emergence of new financial regulation to regulate the operations of MFIs, since regulations give the MFI the ability to take deposits for financing- similar to commercial banks (Cull et.al., 2009), and other factors that affect the nature and direction of this relationship.

2.2 Literature Review

This section introduces many applied studies in the subject of outreach and efficiency of MFIs, and possible factors that may affect this relationship.

2.2.1 Applied Researches

Different researches study the efficiency of MFIs. For example, Tahir and Tahrir (2013) investigated the technical efficiency levels of MFIs in five of Association of Southern Asian Nations (ASEAN) countries (Indonesia, Philippines, Vietnam, Cambodia, and Laos). The study used Data Envelopment Analysis (DEA) for the period 2008-2011, where total assets and operating costs are used as inputs, while gross loan portfolio and total number of active borrowers as outputs. The results show that MFIs in Vietnam have higher efficiency scores, with technical efficiency scores of 87.6% in 2008, 86.7% in 2009, 90.8% in 2010, and 91.3% in 2011; followed by Cambodia with technical efficiency scores of 74.6% in 2008, 77.2% in 2009, 82.1%

in 2010, and 83.8% in 2011; Indonesia has technical efficiency scores of 68% in 2008, 71.5% in 2009, 75.9% in 2010, and 66.1% in 2011; and Philippines have technical efficiency scores of 65.9% in 2008, 63.5% in 2009, 68.8% in 2010, and 69.8% in 2011; Laos shows the lowest efficiency scores of 45% in 2008, 43.8% in 2009, 60.8% in 2010, and 62.5% in 2011. The results also show that the overall technical efficiency is increasing in these ASEAN countries.

Riaz and Gopal (2014) investigated the technical efficiency level of 148 MFIs in Pakistan for the period of 2006-2012, using stochastic frontier approach to estimate the Cobb-Douglas production frontier. Where the gross loan portfolio is a function of two outputs (the number of active borrowers and loan per loan officer), and two inputs (total assets as a proxy of capital, and total loan officers as a proxy of labors). The study found that the mean of technical efficiency is 74%, increasing over the study timeframe. The efficiency scores in 2006 is 77.8%, and increase to 78.32% and 80.3% in 2011 and 2012, respectively. Furthermore, the study found that higher efficiency scores for non- governmental organizations (NGOs) over the micro banks and the rural support programs.

Darko (2013) assessed the technical efficiency using unbalanced panel data of 273 MFIs operating in Sub Saharan Africa (SSA) for the period 2005-2011. The study used DEA to estimate the technical efficiency, and truncated regression model to specify the determinant of this efficiency. The personnel expenses, administrative expenses, and financial expenses were used as inputs, while the financial revenue and

the net loans were used as outputs. The study found that the overall technical efficiency scores range from 10.03% to 100%, with average scores of 62.88%. The study also found that the age of MFIs have a positive effect on their efficiency, while the urbanization and the global financial crises have negative effects on the technical efficiency.

Different researches investigated the outreach and efficiency of MFIs. Masood and Ahmad (2010) investigated the technical efficiency level and its determinants in India, using SFA approach that was proposed by Battese and Coelli (1995). The study was conducted on a sample of 40 MFIs, operating in India during the period 2005-2008. The study used the gross loans portfolio as an output, and the total number of personnel and cost per borrower as inputs. Their results indicated that the efficiency of MFIs in the study sample have a mean of 34%, increasing during the study timeframe. Furthermore; the researchers used the total number of active borrowers as an indicator of outreach. The results showed that the more the number of active borrowers (i.e. the more outreach), the lower the technical inefficiency of production. Finally, the age of MFIs is an important determinant of their efficiency, since the older the institutions, the higher their efficiency. The size of MFIs, measured by the value of their assets, is not a significant determinant of the efficiency.

Crawford et. al. (2014) examined DEA approach to investigate whether profitable, self-sustaining MFIs come at a social cost of reduced outreach. The study was conducted on a sample of 13 Cambodian MFIs in the period 2006-2011. It found that

financially efficient MFIs can be also efficient at reaching clients. In other words, focusing on outreach objective does not mean sacrificing the goal of being profitable and financially sustainable. The study also found that larger MFIs are more efficient in reaching poor than the smaller ones, i.e. higher outreach is achieved by larger size MFIs.

Another study supports these findings was conducted by Seret et.al. (2013). The study used a statistical technique called Self Organizing Maps (SOM). The analysis was performed on data collected for the year of 2011 on a sample of 650 MFIs worldwide. The results showed a positive relationship between social efficiency (outreach to the poor), and the financial efficiency (financial sustainability).

On the other hand, some argue that a trade-off might exist between the outreach and efficiency. For instance, a study by Hermes et.al.(2011), used SFA to measure efficiency and outreach relation for 435 MFIs across countries, over the period 1997-2007. The study found that outreach and efficiency of MFIs are negatively correlated. The study found that the lower average loan balance, and the higher percentage of female borrowers (which are the main dimensions of the depth of outreach); the less efficient are the MFIs. Other variables were used in the study as a possible source of the inefficiency, including the age of MFIs. The study found that the older MFIs are less cost efficient than the newer ones. This supports the claim of the newer MFIs, gained the knowledge and the previously established know-how, from older MFIs, therefore they avoid the factors and conditions that were experienced by older MFIs,

and which may reduce their efficiency. Finally, the study shows that the MFIs efficiency was increasing during the period under study. Cull et.al. (2007) use a sample of 124 MFIs across 49 countries, to examine outreach and profitability. They find that the most profitable MFIs tend to serve less low-income households. It also found that MFIs that focus on solidarity group lending (as an indicator of deeper outreach), have lower financial performance than MFIs focusing on individual-based lending.

Another study for Cull and Spreng (2011) support the findings of Cull earlier studies. The study analyzed the split and privatization of Tanzanian National Bank of Commerce, and also the privatization of MFIs in Tanzania. The study used different ratios in order to find the direction of profitability and outreach goals and whether there is a “tension” between these goals. The results showed that after privatization, the Return on Assets (ROA) ratio has increased, and the non-performing loans ratio was low, which indicates enhanced profitability. On the other hand, outreach indicators such as credit growth and loans to deposit ratio showed a general decline in the outreach for the splitted banks (Cull and Spreng, 2011).

Different factors may affect outreach-efficiency relationship; many studies were conducted to find out such factors, such as the increased competitions between MFIs and the regulation imposed upon them. Navajas et. al. (2003) analyzed the effect of increased competition in Bolivian microfinance market on the outreach. In particular, they studied the effect of the entry of the Caja Los Andes microfinance institution on

the behavior and the workflow of Bancosol, the first MFI in Bolivia. The study showed that during the period of the study (mid 1990s), the increased competition between Caja Los Andes and Bancosol led to focus on less poor borrowers to lend, i.e. less outreach.

Other studies which investigate this issue, found that increasing competition and tendency toward microfinance commercialization have an adverse effects both on financial and social objectives of MFIs. In their analysis, Assefa et. al. (2013) used data from 362 MFI in 73 countries during the period of 1995-2009. In order to measure competition, a Lerner index was constructed. The Lerner index showed that competition between MFIs has increased since 2000. The results also showed that increased competition is associated with less outreach, and with lower financial efficiency and stability reflected by lower loan repayment.

Cull et. al. (2009) found using data from 245 worldwide MFIs, that regulatory supervision is negatively associated with the goal of outreach. Regulations mainly benefit commercially oriented and for profit MFIs, those collect deposits and focus on individual rather than group lending, and that make larger average balance per borrower and focus less on lending females. However, another study by Jenkins (2006) that tried to find the impact of regulation on MFIs workflow, found contradicting results in terms of the effects of regulation on outreach. In one hand, regulation will improve the ability of MFIs in getting deposit fund and relying less on donors' funds; this will increase the number of families benefiting from MFIs

loanable funds, i.e. increasing the outreach. On the other hand, MFIs started to report high default rate, and in order to eliminate this loans default, MFIs should start to charge higher interest rates and target less poor by increasing the average loan size, i.e. less outreach.

2.2.2 The Current Study

This study is an empirical implication of the previous theories and applied research in the Palestinian context. More specifically, it is an application of Hermes et.al. (2011) study, on MFIs working in the OPT, during the period 1999-2014. This study investigates the cost efficiency of MFIs, and analyze the nature of outreach-efficiency relationship for MFIs in the OPT, especially because of the lack of previous studies on this topic in the OPT, using the stochastic frontier analysis (SFA) as statistical tool in investigating the outreach of the MFIs working the OPT.

Chapter Three: Microfinance in the OPT

This chapter introduces microfinance status in the OPT, and the role of PMA in regulating and supervising the MFIs.

3.1 An Overview of Microfinance in the OPT

The microfinance sector in the OPT is not contemporary; many international organizations started their work in providing the microfinance services after the NAKBA in 1948, such as the Young Men's Christian Association (YMCA) and CHF/RYADA Cooperative Housing Foundation. While some MFIs started after the Israeli occupation (NAKSA) in 1967, such as the American Near East Refugee Aid (ANERA). The number of MFIs in the OPT started to increase rapidly from the early 1990s till the end of 2015. Specifically, total number of the institutions providing microfinance services by the end of 2015 has reached fourteen institutions, with different legal status; only six of these institutions are registered and regulated by PMA (Palestine Monetary Authority [PMA], 2015).

In 2004, the Palestinian Network for Small and Micro Finance (SHARAKEH) was established as a non-governmental, non-profit institution that aims to develop and promote the microfinance sector in the OPT, in addition to enhancing the performance and cooperation between MFIs, and introducing the Palestinian microfinance sector in the national and the international events (SHARAKEH, 2015).

According to the latest statistics of SHARAKEH in December 2015, three MFIs cover the largest portion of the microfinance market, according to the values of their outstanding loan portfolios and the numbers of their active clients. These institutions are: FATEN, CHF/RYADA, and UNRWA, respectively. Most MFIs in the OPT grant loans for different purposes and in different economic sectors, e.g. general trade, services, production, agricultural, consumption, and housing. Their branches are located in the north, central, south West Bank (WB) and in Gaza Strip (GS)³.

The outstanding loans portfolio for MFIs, are presented in Table 3.1, reached to about USD 145.1 million in December 2015, lent to about 64,079 borrowers, where 45% of them were female borrowers (SHARAKEH, 2015).

Table 3.1 also illustrates operational and financial indicators for six MFIs in the OPT reported by SHARAKEH as of December, 2015. The table displays the value of outstanding loans portfolio, average loan size, number of staff and borrowers, number of the branches, and area of coverage.

All MFIs serve both the West Bank (WB) and Gaza Strip (GS). FATEN, UNRWA, and RYADA have the highest amount of gross loan portfolio, and they penetrate the market by their large number of branches and staff. These institutions also differ in the average loan size; this reflects the institutions internal policies in targeting the poor. For instance, UNRWA has large portfolio, and lends to a large number of

³ North WB: Nablus, Jenin, Tulkarem, and Qalqelia. Central WB: Jerusalem, Ramallah, Jericho. South WB: Bethlehem, Hebron.

borrowers, and thus the average loan size is small. However, RYADA has a large portfolio, but lends to smaller number of borrowers, which increases the average loan size. It is evident that MFIs in the OPT differ in their adaption of outreach policies, this may or may not affect their efficiency.

Table 3.1: Operational and Financial Indicators of MFIs in the OPT in December, 2015

| MFI | Number of Branches | Number of Staff | Number of Active Borrowers | Outstanding Portfolio (in Million USD) | Average Loan Size (USD) |
|--------------|---------------------------|------------------------|-----------------------------------|-----------------------------------------------|--------------------------------|
| ASALA | 7 | 45 | 3,135 | 6,683,155 | 2,131.80 |
| RYADA | 8 | 80 | 6,570 | 22,697,481 | 3,454.70 |
| ACAD | 7 | 47 | 3,688 | 9,592,731 | 2,601.10 |
| FATEN | 32 | 217 | 31,575 | 82,681,431 | 2,618.60 |
| UNRWA | 11 | 168 | 16,230 | 14,501,450 | 893.5 |
| REEF | 10 | 36 | 2,901 | 8,955,814 | 3,087.10 |
| TOTAL | 75 | 593 | 64,079 | 145,112,062 | 2,464 |

Source: SHARAKEH (2015), Unpublished Data

Table 3.2 illustrates aggregate statistics for the six MFIs over the three years (2013-2015). In term of microfinance loans distribution by economic sectors, the highest portion of outstanding loans is concentrated in the services/trade activities and consumption, whereas the lowest percentage of microfinance loans is allocated to the production/craft activities. Furthermore, the trend shows that a decline in the loan's distributed for productive, income generating activities (such as trade and agriculture), and an increase in loans distributed for consumption and housing.

Although this change is not sharp, attention should be made to this change to avoid the deviation of microcredit into economically unproductive activities.

Table 3.2: Economic Indicators of MFIs (2013-2015)

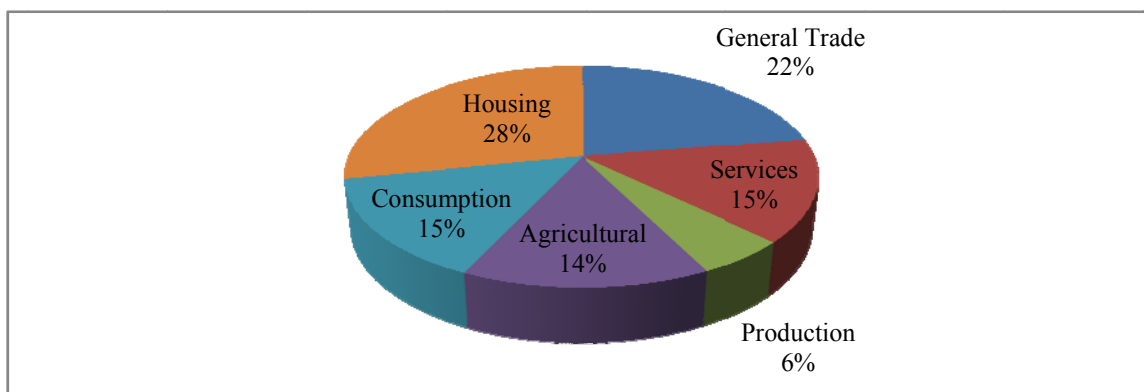
| Indicators/Year | 2013 | 2014 | 2015 |
|--------------------------------------------------------------------|-------------|-------------|-------------|
| Gross loans portfolio (in US \$) (segmentation)⁴ | 91,893,890 | 109,556,441 | 145,112,062 |
| % for agricultural activities | 27% | 23.20% | 22.60% |
| % for production/craft activities | 7% | 7.20% | 6% |
| % for services/trade activities | 36% | 40.10% | 35.40% |
| % for consumption and others | 30% | 29.50% | 36% |
| Value of loans outstanding (Active) end of period by area | | | |
| West Bank (WB) | 67.50% | 71.90% | 71.70% |
| Gaza Strip (GS) | 32.50% | 28.10% | 28.30% |
| Percentage of loans disbursed during each period by gender | | | |
| Male | 49.60% | 53% | 55% |
| Female | 50.40% | 47% | 45% |

Source: SHARAKEH (2015), Unpublished Data

Figure 3.1 represents the allocation of microfinance loans according to the economic sector for the year 2015.

⁴ Consumption loans are offered to finance the purchase of consumer goods such as cars and furniture. While the production loans are offered to finance the production of crafts, embroidery, food and beverages. The agriculture loans are offered to finance any activity related to agriculture and livestock production.

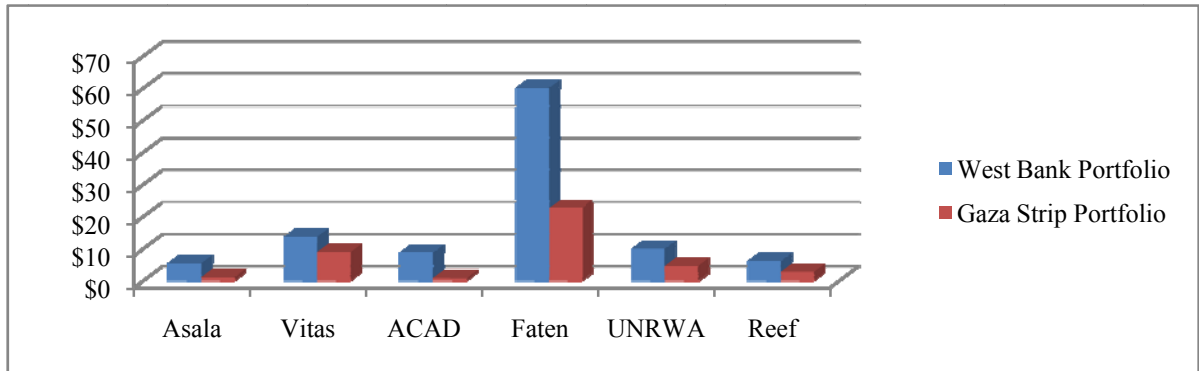
Figure 3.1: Allocation of MF Loans per Economic Sector, 2015



Source: SHARAKEH (2015), Unpublished Data

The geographical distribution of outstanding loans portfolio, figure 3.2, is heavily concentrated in WB (%71.7 in WB and %28.3 in GS in 2015). One of the reasons that may justify the reluctance of MFIs to extend loans in GS can be attributed to the high risk associated with political conditions. Therefore, the MFIs avoid engaging in wide lending activities there.

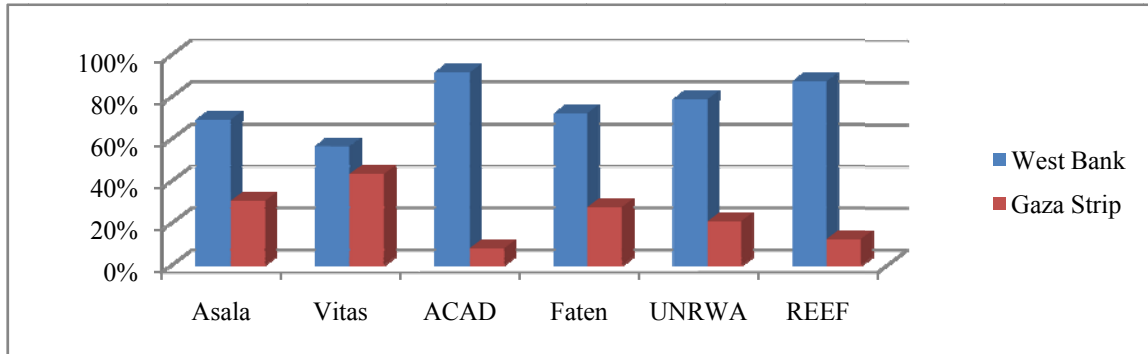
Figure 3.2: Value of Loans Portfolio Distributed (Millions USD) in West Bank and Gaza Strip in 2015 by MFIs.



Source: SHARAKEH (2015), Unpublished Data

Analysis of loan by gender indicates that the percentage of female borrowers is declining over time. Data in Table 3.2 show that percentage of loans distributed to female borrowers is less than that is distributed to males. This trend may contradict with the mission of many MFIs in the OPT, that consider females as their main target group of borrowers. Moreover, this trend indicates a decrease in the depth of outreach of the MFIs working in the OPT. Figure 3.3 shows the percentage of female borrowers by MFIs in the WB and GS for the year 2015. Lending to females in WB is broader than in GS.

Figure 3.3: The Percentage of Female Borrowers in West Bank and Gaza Strip, 2015



Source: SHARAKEH (2015), Unpublished Data

The microfinance sector in the OPT is still a small and emerging sector, with many obstacles facing it. In other words, the nature of political, economic, and social environment restrict the development and the spread of Palestinian MFIs services.

According to Abdel Kareem et. al. (2013), the political risk is represented by the reluctance of the clients from starting their own businesses (enterprises), due to their fear of the physical and financial destruction of their projects by the Israeli army. In term of the economic obstacles, the high poverty and unemployment rates result in a low purchasing power of microfinance enterprises products. Finally, the social risk, represented by the lack of the financial literacy among the target clients (especially females in rural areas), and the religious factors for some people impedes the development of this sector in the OPT. These factors create unstable, and unsafe environment for MFIs, which limit their geographical spread, and constrain their ability to provide a large and wide variety of products that offered by other MFIs worldwide. Indeed, all of these conditions are reflected in the low percentage of the

microfinance loans to the total lending in the OPT, and to the gross domestic product (GDP). For instance, the percentage of microcredit to total banking lending was only 3.13% in 2015, whereas the percentage of this microcredit to GDP was almost 1.9% in the same year. This indicates an extremely low and weak contribution of microfinance in the Palestinian economy.

Table 3.3 shows the percentage of loans portfolio to nominal GDP in different Arab countries for the year 2012. The contribution of microfinance sector in the GDP is low in these countries. The OPT shows the highest percentage due to their special situation, where a large portion of international agencies aids and grants are offered to MFIs in the OPT; this increases the value of loans outstanding.

Table 3.3: The Loans Outstanding to GDP in Arab Countries, 2012

| Country | Value of loans outstanding/ GDP |
|----------------|----------------------------------------|
| Egypt | 0.14% |
| Tunisia | 0.32% |
| Morocco | 0.24% |
| Jordan | 0.53% |
| Syria | 0.04% |
| Lebanon | 0.41% |
| OPT | 1.45% |

Source: Abdel Kareem, N., Abed, M., and Abu Zeiton, A. (2013). (for values of loans outstanding).

3.2 Palestine Monetary Authority PMA Regulations and Supervision

In the last few decades, MFIs operating in the OPT suffered from the absence of supervisory and regulatory body, which put the legislations to control MFIs activities and legal structure. Hence, in 2010, the PMA combined MFIs to the set of financial entities that include banks (Islamic and commercial) and money changers.

PMA passed laws to regulate the MFIs operations, including licensing new MFIs, and defining the capital structure of new and existing MFIs. The work of PMA in this field started by putting different instructions and laws, such as instruction No.(1) of the year 2011, allowing clients of these institutions to receive a copy of their credit reports in order to accentuate the principle of transparency and the full disclosure, to ensure the rights and the obligations of both MFIs and their clients, and to avoid any misunderstanding in this relationship.

Moreover, PMA imposed another instruction for the same year, concerning the necessity of updating the personal and the financial data of the clients, in addition of relying on computerized and advanced technology instead of manual paper work, to save time and cost, to raise the efficiency of MFIs, and to reduce the operational risks (PMA, 2011).

Another instruction was imposed in 2012 and 2014, concerning licensing new MFIs, adjustments on old MFIs such as determining the minimum capital requirements from the institution to continue its operations, in addition of MFIs management issues such

as the formulation of the board of directors, and the executive management, general assembly meetings, internal and external auditing (PMA, 2012; PMA, 2014).

Chapter Four: Research Methodology and Descriptive Data Analysis

This chapter introduces the methodology and the rationale for method selection, it illustrates the selection process of the cost frontier and the inefficiency model variables, and provide a description of the variables.

4.1 Research Methodology

This section illustrates how the SFA provides a new insight in evaluating the cost efficiency and its relationship to the outreach goal, for MFIs operating in the OPT.

The SFA is a parametric approach used as an efficiency analysis technique. It was first developed by Meeusen and Van den Broeck (MB) and by Aigner, Lovell, and Schmidt (ALS) almost simultaneously in 1977 (Kumbakar, 2000). The SFA is based on the idea that every economic agent has some degree of individual inefficiency; that is, it cannot exceed its ideal frontier (Belotti et. al., 2012). In other words, firms are efficient if they are able to maximize the quantity of output given the quantity of inputs, or if they reduced the cost of inputs to the minimum level given the quantity of output (Quayes and Khalily, 2013). In the current study, the cost efficiency is defined as “the minimum cost of inputs that is required to produce a specific output” (Sarsour and Daoud, 2015).

What distinguish SFA from other efficiency analysis methods (non-parametric approaches like Data Envelopment Analysis (DEA)) is that SFA uses maximum likelihood estimation method to run a regression model, with a specific functional form. That would help in testing hypothesis. In addition of estimating composite error term (unlike DEA), it includes the classical measurement error and the inefficiency term (Belotti et.al., 2012). Moreover, SFA generates firm specific efficiency estimation; this could help these firms in improving their operational efficiency (Sarsour and Daoud, 2015).

The main idea of SFA could be displayed by the following equation:

$$q_{it} = f(z_{it}, \beta) * \xi_{it}$$

where q_{it} is the output produced by the firm i^{th} at time t , z_{it} is the inputs used in the production process, β represents technology parameters, and ξ_{it} represents the level of technical efficiency for firm i^{th} at time t . The value of ξ_{it} lies between zero and one. The closer the value of ξ_{it} to one, the greater is the efficiency. When $\xi_{it}=1$, the firm achieves the optimal output from its inputs, given technology β . The smaller the value of ξ_{it} (the closer to zero), the higher the inefficiency, or the lower the efficiency.

Because the output q_{it} is strictly positive, the degree of technical efficiency will also be strictly positive ($\xi_{it} > 0$).

Output is also assumed to be subject to random shocks, implying that:

$$q_{it} = f(z_{it}, \beta) * \xi_{it} * \exp(v_{it})$$

Taking the natural logarithm for the two sides:

$$\ln q_{it} = \ln f(z_{it}, \beta) + \ln \xi_{it} + v_{it}$$

Assuming that there are k inputs and the production function is linear in logs, defining $u_{it} = -\ln \xi_{it}$ yields:

$$\ln q_{it} = \beta_0 + \sum_{j=1}^k \beta_j \ln z_{jit} + v_{it} - u_{it}$$

The cost function of MFIs is not directly observable. Consequently, this study uses the stochastic cost frontier developed by Aigner et. al.(1977), using unbalanced panel data collected from MFIs operating in the OPT for the period of 1999-2014⁵.

According to Kumbhakar and Lovell (2000), the cost frontier function is:

$$c(y,w) = \min_x \{w^T x: x \in L(q)\}.$$

Where (w) represents vector of input prices and (q) represents output. This study estimates the following cost frontier:

$$\ln C_{i,t} = \beta_0 + \beta_1 \ln q_{it} + \sum_n \beta_n \ln w_{itn} + v_{i,t} - \alpha u_{it}$$

Where C_{it} is cost, q_{it} represents the output, w_{jit} are input prices, $v_{i,t}$ is statistical random (idiosyncratic) error that is assumed to be independently and identically

⁵ Moving from the production frontier into cost frontier is according to the duality theorem between cost and production functions. See Shephard (1967) (2015).

distributed with zero mean, and constant variance σ_v^2 $\{v_{i,t} \sim ddN(0, \sigma_v^2)\}$, and $u_{i,t}$ is non-negative cost inefficiency component, and

$$\alpha = \begin{cases} 1, & \text{For production function} \\ -1, & \text{For cost function} \end{cases}$$

According to the sign of α , the inefficiency effect is required to lower the output or raise the cost.

The inefficiency component $u_{i,t}$ is assumed to be independently and identically distributed with truncated normal distribution $\{u_{i,t} \sim N^+(\mu_{i,t}, \sigma_u^2)\}$ of constant variance σ_u^2 , and mean $\mu_{i,t}$ which is a linear function of explanatory variables $x_{i,t}$ associated with cost inefficiency for MFIs over time (Battese and Coelli, 1995).

$$\mu_{it} = \delta_0 + \sum_n \delta_i x_{itn} + w_{it}$$

Since the model is time variant, the technical inefficiency that is represented by u_{it} could be increasing, decreasing or constant over time. This could be specified by the following equation:

$$u_{i,t} = \exp[-\eta(t - T_i)]u_i$$

Where T_i is the last period in the i^{th} panel; η is the decay parameter. If η is positive, then technical inefficiency is decreasing over time. If η is negative, then technical inefficiency is increasing over time. If η is zero, then the technical inefficiency is constant over time.

The summation of $v_{i,t}+u_{i,t}$ produces the composite error term that results from bad luck, political events, market and economic conditions, and other uncontrollable shocks (represented by $v_{i,t}$). This error also results from technical inefficiency represented by $u_{i,t}$ (Berger et.al., 1993). $v_{i,t}$ and $u_{i,t}$ should be distributed independently of each other.

According to Hermes et. al.(2011), the SFA technique is used to estimate the cost frontier function, subject to inefficiency of MFIs. A similar model is used here to estimate the total cost frontier function of MFIs working in the OPT, subject to cost inefficiency results from trial of MFIs to achieve the outreach goal.

Before adopting Hermes et. al (2011) model in the Palestinian case, a likelihood ratio test (LR) is conducted in order to determine the functional form of the cost frontier. In other words, is the form a Cobb-Douglas form or Translog form? Setting the null hypothesis $H_0: B_{4...9}=0$, which means that all the interactions and the quadratic terms equal to zero, i.e. the cost frontier has a Cobb-Douglas form, and the alternative hypothesis $H_1: \text{reject } H_0$, we calculate $\lambda_{LR} = -2\{\ln[L(H_0)/L(H_1)]\} = -2\{\ln[L(H_0)] - \ln[L(H_1)]\}$ ⁶.

Where $L(H_0)$ and $L(H_1)$ are the values of the likelihood function under the null and the alternative hypothesis, respectively. If the value of λ_{LR} is greater than the

⁶ $B_{4...9}$ are the coefficients of the interaction and quadratic terms in the below cost frontier model (model 1).

tabulated chi-square, then the null hypothesis is rejected, and the cost frontier has a translog functional form⁷.

Two approaches are used to specify the cost frontier of MFIs: The production approach and the intermediation approach. The production approach considers MFI a producer of loans and other assets using its inputs (capital and labor) (Kuo et.al., 2006). However, the intermediation approach considers the MFI main function is to transfer fund between funds providers (like depositors) and borrowers of MFIs loans at the lowest cost (Rezvanian and Mehdian, 2002)⁸. The production approach is more appropriate in the case of MFIs in the OPT, since these institutions do not depend on deposits to finance their lending activities. Therefore, MFIs in the OPT are producers rather than intermediaries of loan portfolio.

The translog cost frontier function can be specified as follow:

$$\begin{aligned} \ln TC_{i,t} = & \beta_0 + \beta_1 \ln (OC_{i,t}) + \beta_2 \ln (FC_{i,t}) + \beta_3 \ln (GLP_{i,t}) + 0.5 * \beta_4 \ln (OC_{i,t})^2 + 0.5 * \beta_5 \ln \\ & (FC_{i,t})^2 + 0.5 * \beta_6 \ln (GLP_{i,t})^2 + \beta_7 \ln (OC_{i,t}) \ln (FC_{i,t}) + \beta_8 \ln (OC_{i,t}) \ln (GLP_{i,t}) + \beta_9 \ln \\ & (FC_{i,t}) \ln (GLP_{i,t}) + \beta_{10} LLR_{i,t} + \beta_{11} \ln ASSETS_{i,t} + \beta_{12} ROE_{i,t} + v_{i,t} + u_{i,t} \dots \dots \dots (1) \end{aligned}$$

And the inefficiency model can be specified:

⁷ Log likelihood under the null hypothesis (Cobb–Douglas)= 106, and under the alternative hypothesis (Translog)=110.31. Therefore, LR = -2*[106 – 110.31] = 8.62 which is greater than X²(3)=7.054.

⁸ The definitions of the production and the intermediation approach were developed for banks, but several studies applied them to MFIs due to the similarity in the main functions between banks and MFIs.

$$\mu_{i,t} = \delta_0 + \delta_1 \ln ALB_{i,t} + \delta_2 F_{i,t} + \delta_3 GRANT + \delta_4 AGE + \delta_5 \ln ASSETS_{i,t} + \delta_6 LLR_{i,t} + \delta_7 DER_{i,t} + w_{i,t} \dots \dots \dots (2)$$

The dependent variable TC refers to total costs facing MFI, and the independent variables are: OC refers to operating costs. FC refers to financial costs. GLP refers to gross loan portfolio. All of these variables were transposed into the natural logarithm form (ln).

The total cost ($TC_{i,t}$) is calculated by adding the operating and the financial costs facing the i^{th} MFI at time t (Hermes et.al., 2010).

The operating costs ($OC_{i,t}$), are the costs related to MFIs operations. They are calculated by the summation of personnel expense, and administrative expense for the i^{th} MFI at time t . The administrative expenses include all the establishment costs, such as the insurance cost, provident fund for employees, depreciation and amortization, and marketing and advertising expenses⁹. The personnel expenses, on the other hand, include salaries paid to the employees (Agarwal, 2006)¹⁰.

The financial cost ($FC_{i,t}$) or the funding cost, refers to interest and fees expense on funding liabilities, loans and deposits (Stauffenberg et.al., 2003). Since the MFIs in the OPT do not receive deposits, then the financial cost on this study will be the interest and fees expense on the loans borrowed by these MFIs.

⁹ In brief, the administrative expense include all the expense facing MFIs excluding the financial and the personnel expenses.

¹⁰ The operating costs variable is taken as a proxy of labor cost.

The gross loan portfolio ($GLP_{i,t}$), refers to all outstanding principals due for all outstanding client loans. This includes current, delinquent, and renegotiated loans, but does not include loans that have been written off. The GLP does not include interest receivable. The GLP is the major output produced by MFIs in the OPT.

Moreover, there are a group of control variables that may have an influence in MFIs cost frontier. First, the loan loss rate ($LLR_{i,t}$) of i^{th} MFI at time t , equals the total amount of loans written off during the period minus the value of recovered loans divided by the average gross loan portfolio. This ratio is a measure of the outstanding loans' quality. The higher the LLR, the less efficient the MFIs are and the total cost is expected to increase (a positive sign of LLR coefficient is expected).

Second, MFI size, measured by MFI total assets (ASSETS), is used to detect the impact of MFI size on its total cost. The positive value of (ASSETS) coefficient represents the case of diseconomies of scale, while the negative sign implies economies of scale.

($ROE_{i,t}$) represents the return on equity for the i^{th} MFI at time t . ROE equals to net operating income after tax, divided by MFI average equity. It is one of the main measures of profitability of the profit firms, and since the majority of MFIs supposed to be non for profit institutions, the ROE is a proxy measure of commercial viability and performance (Rahman and Mazlan, 2014). ROE is an indicator of management

efficiency in managing the equity fund (including investors and donors fund), to generate operating profit.

The ($FC_{i,t}$) variable is excluded from the model, because it creates a problem in the estimation process. There are many explanation of why the existence of financial cost in this model creates a problem; one of them is that the financial cost represents a very small percentage of the total cost (about 3.5% in this study sample data); where the greatest component of the total cost comes from the operating cost. One reason of the small value of the financial cost occurred by MFIs in the OPT is because most of these MFIs get their fund from soft loans, in addition to the grants and donations from different donors. Therefore, the value of the interest expense on the loans borrowed by the MFIs is very small if compared to the other costs (SHARAKEH, 2011).

In the inefficiency model (model (2)):

($\mu_{i,t}$) represents the first moment of inefficiency distribution in i^{th} MFI at time t . This represents the mean of the inefficiency term $u_{i,t}$ in the above cost frontier. It is regressed on a set of the following explanatory variables which may be a source of this inefficiency:

($ALB_{i,t}$) represents the average loan balance per borrower offered by i^{th} MFI at time t . It is calculated by dividing the gross loan portfolio on the total number of active borrowers.

$(F_{i,t})$ represents the percentage of female borrowers in i^{th} MFI at time t . It is calculated by dividing number of active females' borrowers on total number of active borrowers.

$(AGE_{i,t})$ represents the age of i^{th} MFI at time t . In other words, the number of years since establishment (Hermes et.al., 2011). This variable was added to detect whether older MFIs are more efficient than the newer ones. The positive sign of this variables means that the older MFIs have higher cost inefficiency than newer ones and vice versa.

(GRANT) is a dummy variable that indicates whether the grants represent the main sources of fund for MFIs; i.e., to find whether the MFIs that depend on grants as a main source of fund are more efficient than those that do not. This is because the effects of grants (subsidies) on the efficiency of MFIs are a subject of debate (Hudon and Traca, 2006). This variable could help in explaining the sources of inefficiency for MFIs in the OPT.

$(ASSETS_{i,t})$ represents the value of total assets of i^{th} MFI at time t . This variable was used in several studies to study the impact of MFI size on its efficiency (Masood and Ahmad, 2010).

$(LLR_{i,t})$ represents the loan loss rate. This variable was included in this model in order to detect the impact of write off loans on MFIs cost efficiency. The expected

sign in this model is positive; in other words, the higher the LLR, the higher the cost inefficiency and vice versa¹¹.

($DER_{i,t}$) refers to debt to equity ratio of i^{th} MFI at time t . This variable was added in order to find the impact of the effective financial management on MFIs cost efficiency (Masood and Ahmad, 2010). The higher the value of DER, the less effective is the financial management of the firm. The sign of DER is expected to be positive, where the higher the value of DER, means that the MFI relies heavily on debt to finance itself; as a consequence, it will increase the financial cost of this institution, higher cost inefficiency is expected, and vice versa.

In this study, the outreach is measured by two variables: ALB and F. The average loan balance per borrower (ALB) represents the first dimension of outreach, where the higher its value, the less is the outreach. That is because raising ALB means that the MFIs focus less on serving the poor, since poor people will borrow a smaller amount of funds than less poor people. In other words, the higher the value of ALB means that MFIs focus less on lending the poor and more in lending higher income borrowers; i.e., less outreach to poor (Zerai and Rani, 2012).

The percent of female borrowers in MFIs (F) represents the second dimension of outreach. The higher the value of (F), the higher is the outreach (Woller and Schreiner, 2013). This is because the majority of poor (especially in the less

¹¹ The definitions of OC, GLP, ALB, AGE, LLR, ROE, MFITYPE and F are obtained from Mix Market glossary.

developed countries) are females, who represent the most vulnerable and inferior class in these societies (Cheston and Kuhn, 2002). As a result, lending more females means higher outreach achieved by MFIs.

In this model, if the sign of (ALB) coefficient is negative and the sign of (F) coefficient is positive, then a trade-off between outreach and efficiency will exist. This means that focusing more on the outreach goal by targeting the poor, especially the poor females, will increase the inefficiency of MFIs. The opposite signs occur in case of compatibility between outreach and efficiency.

The parameters of the cost frontier are estimated using the maximum likelihood (ML) method, while the parameters of the inefficiency model are estimated using the ordinary least square (OLS) method.

Before estimating the cost frontier, some constraints are imposed on model (1) to ensure the homogeneity of degree +1 of cost frontier in input prices. These constraints in this cost frontier are:

$$\sum_1^2 \beta = 1$$

$$\sum_4^6 \beta = \sum_7^9 \beta = 0$$

The first constraint implies that inputs prices coefficients (here the operating and the financial costs) are summed up to 1, while the second constraints imply that all the summations of interaction and quadratic terms in the cost frontier are equal to zero¹².

4.2 Descriptive Data Analysis

The sample data are unbalanced panel data of seven MFIs conducting their businesses in the OPT, during the period 1999-2014. The data used in this study are derived from MIX Market TM, which is a web-based microfinance information platform, that provides information of MFIs worldwide, funds that are invested in microfinance, MFI networks, raters/external evaluators, and advisory firms, etc... (MIX Market, 2015). Furthermore, financial data are derived from the audited financial statements and annual reports available from the MFI's websites.

The selection of MFIs is based on the availability of data during the study period (16 year). After the adjustments for the missing data, 58 MFI-year observations for the following MFIs:

- 1- The Arab Centre for Agricultural Development (ACAD).
- 2- The Palestinian Business Women Association (ASALA).
- 3- Palestine for Credit and Development (FATEN).
- 4- Palestinian Agricultural Relief Committees/Saving and Lending Associations (PARC/SLA).

¹² The first constraint does not apply since (FC) is removed from the cost frontier model.

- 5- Reef Finance Co. (REEF).
- 6- Cooperative Housing Foundation (CHF/RYADA).
- 7- United Nations Relief and Works Agency/Microfinance Department (UNRWA/MD).

Four of these institutions are classified as non-bank financial institutions (NBFIs). They are: ACAD, FATEN, REEF, and RYADA. Two of these institutions are classified as non-governmental organizations (NGOs). They are: ASALA and PARC¹³. Finally, the microfinance department at the UNRWA, does not have a specific legal form, therefore, the study classifies it in accordance to its legal status as: OTHER¹⁴.

Table 4.1 displays the number of MFIs per year for which information is available. It is observed that very few observations are available for the period 1999 to 2003 (one or two observation per year). Thereafter, the number of observations start to increase.

¹³The Non-Bank Financial Institutions (NBFIs) definition according to Mix Market (2015) is "An institution that provides similar services to those of a Bank, but is licensed under a separate category. The separate license may be due to lower capital requirements, to limitations on financial service offerings, or to supervision under a different state agency", while the Non-Governmental Organizations (NGOs) can be defined as "An organization registered as a nonprofit for tax purposes or some other legal charter. Its financial services are usually more restricted, usually not including deposit taking" (Mix Market, 2015).

¹⁴ The legal form (OTHER) in the study sample refers to one MFI: UNRWA, since it's representing the microfinance department subordinated by the United Nations Reliefs and Work Agency for Palestinian Refugees. Currently, there is a trend toward converting this department into a private institution.

Table 4.1: Description of the Panel (Number of MFIs per Year)

| Year | Number of MFIs |
|--------------|-----------------------|
| 1999 | 2 |
| 2000 | 2 |
| 2001 | 1 |
| 2002 | 2 |
| 2003 | 2 |
| 2004 | 3 |
| 2005 | 4 |
| 2006 | 4 |
| 2007 | 5 |
| 2008 | 7 |
| 2009 | 6 |
| 2010 | 5 |
| 2011 | 6 |
| 2012 | 2 |
| 2013 | 3 |
| 2014 | 4 |
| Total | 58 |

Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015].

One possible reason for the lack of information during the early period covered in this study is that many MFIs started their operations in the late 1990s. Another potential reason can be traced back to the fact that these institutions did not make a full disclosure of their financial data to the public. This might be due to their private legal forms; since many of these institutions provide their financial information only to donors, lenders, and owners.

Table 4.2 presents the number of observations available per MFI. It is noticed that there are variations in data availability between these MFIs. It can be observed from

this table is that FATEN and ACAD encompass a large proportion of the study observations (almost 47%), while some MFIs show a very few observations (such as PARC and REEF).

Table 4.2: Description of the Panel (Number of Observations per MFI)

| MFI Name | Number of Available Observations |
|-----------------|-----------------------------------------|
| ACAD | 12 |
| ASALA | 9 |
| FATEN | 14 |
| PARC | 3 |
| REEF | 3 |
| RYADA | 9 |
| UNRWA | 8 |
| TOTAL | 58 |

Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015].

Table 4.3 presents the descriptive statistics of the variables used in estimating the cost frontier, and some other variables used in the study. After observing the minimum, the maximum, and the standard deviation of the cost frontier variables, it is observed that a huge variability output, input prices, and sequentially the total cost. These variations occur over time and between the firms. For instance, the minimum total cost which amount to (USD 8,095), is too far from the maximum total cost (almost USD 5.7 million). Moreover, the minimum total gross loan portfolio (USD 421,427), is very small in comparison to the maximum gross loan portfolio (UDS 59.6 million). The same analysis applies to input prices.

Table 4.3: Summary of Descriptive Statistics¹⁵

| Variables | Mean | Standard Deviation | Minimum | Maximum |
|------------------|-------------|---------------------------|----------------|----------------|
| TC | 1,432,065 | 1,251,940 | 8,095 | 5,693,683 |
| OC | 1,353,485 | 1,141,241 | 8,095 | 4,638,580 |
| FC | 78,580 | 232,760 | 0 | 1,299,141 |
| GLP | 8,483,800 | 10,200,000 | 412,427 | 59,600,000 |
| F | 56.40% | 38.60% | 1.36% | 100% |
| ALB | 1,850 | 1,126 | 244 | 6,065 |

Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

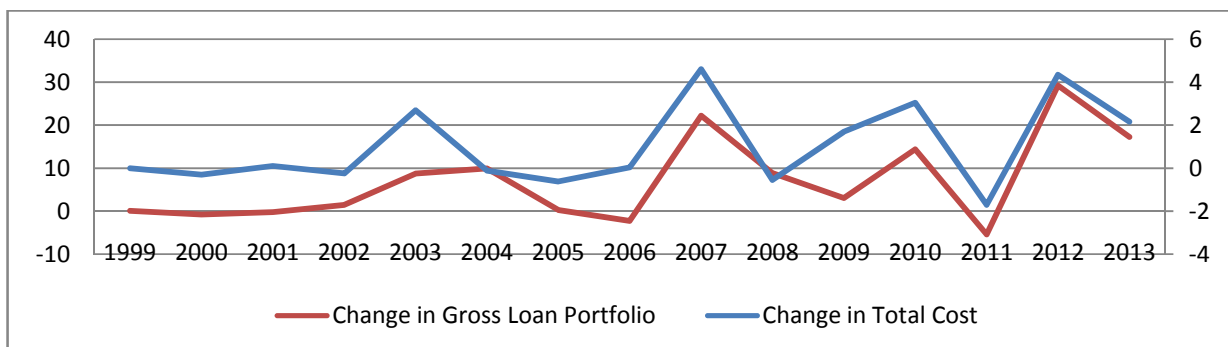
The analysis of the descriptive statistics for other variables in the Table 4.3 indicates that the percentage of female borrowers' variable ranges between 1.3% and 100%. This reflects the differences between MFIs in their main target group of clients (borrowers). That is, some MFIs focus entirely on lending females and consider this lending as a major part of their strategies (such as ASALA, FATEN and PARC), while others do not pay a considerable attention on lending females, and do not consider it as a leading strategy.

Figure 4.1 shows the changes in the total cost and the gross loan portfolio in MFIs in the sample of the study. It can be observed here that these two variables are moving, mostly, in the same direction over time. This is because the increase in gross loan

¹⁵ TC: Refers to the total cost (USD), OC: Operating cost (USD), FC: Financial cost (USD), GLP: Gross loan portfolio (USD), F: The percentage of the female borrowers, and ALB: The average loan balance per borrower (USD).

portfolio will definitely require an increase in the total cost; this incurs as a motive to produce this output and vice versa.

Figure 4.1: The Change in Gross Loan Portfolio and Total Cost of MFIs in OPT (In Millions USD)



Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

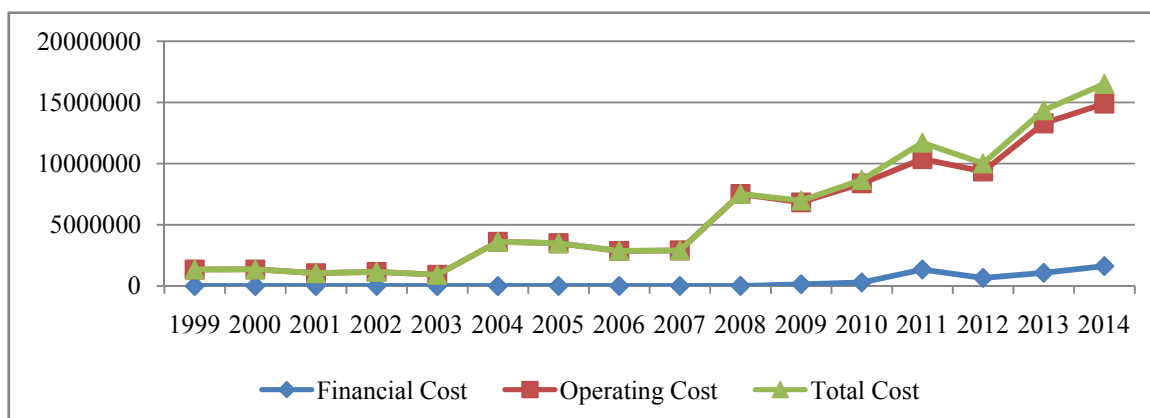
Figure 4.1 also shows that there are fluctuations in the total cost and gross loan portfolio overtime. However, there is no specific direction for their movements. While total cost and gross loan portfolio increase in some period of time, they might decrease in the next period. The general trend, however, shows that both of these two variables were increasing in the recent years when they are compared with themselves at the beginning of the period. This indicates increasing operations and the products provided by these MFIs overtime.

One possible explanation for the variation in the total cost and gross loan portfolio is the special situation of MFIs in the OPT. Several MFIs depend partially or entirely on foreign grants and donations to operate. These funds are subject to blockage or

fluctuation in some years, due to the unstable internal political environment and the tenses in foreign relations.

Figure 4.2 shows the total cost of MFIs, and its two components; the operating cost and the financial cost. The figure shows that the operating cost and the total cost has been clearly increasing since 2003. The financial cost shows a very low level before 2010, thereafter it starts to increase; however, it is still very low compared to the value of operating cost. This indicates that the operating cost constitutes the largest portion of the total cost, while the financial cost contributes only to a very low level. Therefore, it can be concluded that the majority of the total cost in Palestinian MFIs came from their operating cost. This is due to the fact that these institutions do not pay, or pay a very low interest expense on their sources (or the majority sources) of funds.

Figure 4.2: The Cost Structure of MFIs in OPT, 1999-2014 (In Millions USD)



Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

Table 4.4 displays the means of the key variables included in the cost frontier, according to some selected years. Looking at changes in the value of these means over the years, it is clear that there is an increase in the average gross loan portfolio which is associated with an increase in total cost. It is also clear that the increase in average gross loan portfolio overtime is greater than the increase in the total cost, which indicates an increasing in the overall cost efficiency. In the case of the sample of the study, however, this explanation might not be accurate due to the differences in the number of MFIs included each year of the study. Therefore, it cannot be judged, in this case, whether the overall efficiency has been increasing or decreasing over time. Therefore, a further analysis is needed here, which is one of the main objectives of this study.

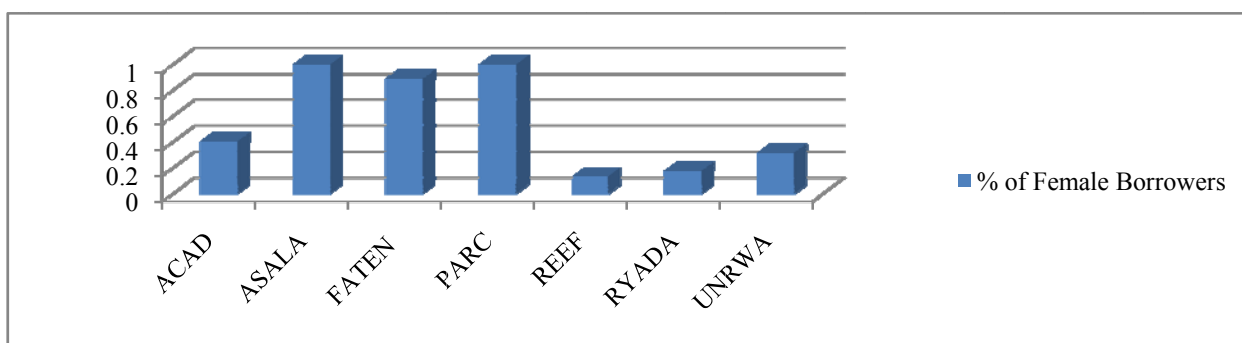
Table 4.4: The Means of Cost Frontier Variables for Some Selected Years

| YEAR | TC | OC | FC | GLP | LLR | Number of MFIs |
|------|-----------|-----------|---------|-----------|--------|----------------|
| 1999 | 674,120 | 674,120 | 0 | 1,049,246 | 50% | 2 |
| 2002 | 575,636 | 573,266 | 2,369 | 600,642 | 12.90% | 2 |
| 2005 | 873,782 | 872,750 | 1,033 | 5,339,711 | 0.49% | 4 |
| 2008 | 1,074,829 | 1,072,955 | 1,873 | 5,940,102 | 3.40% | 7 |
| 2011 | 1,953,923 | 1,729,049 | 224,829 | 1.13E+07 | 0.67% | 6 |
| 2014 | 2,755,097 | 2,484,774 | 270,324 | 1.82E+07 | 0.24% | 6 |

Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015].

Figures 4.3 and figure 4.4 show the bar charts of the average percentage of the female borrowers and the mean of the average loan balance per borrowers, respectively, for each MFI in the sample. Figure 4.3 shows that three MFIs (FATEN, ASALA, and PARC), consider females as the main target group of borrowers. While others like (REEF and RYADA) do not adopt lending females as a leading strategy. These differences in the percentage of the female borrowers may occur due to the differences between these MFIs donors' perspectives, and also due to the differences in these MFIs mission, vision, and goals.

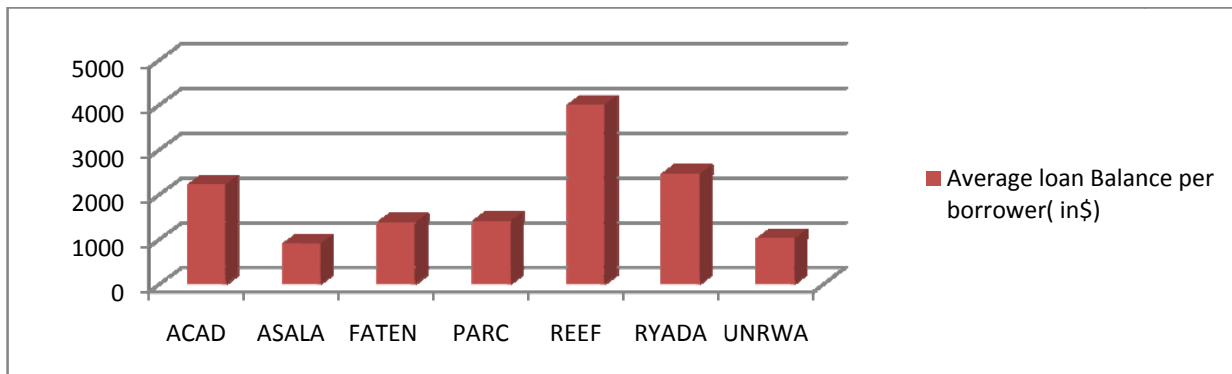
Figure 4.3: The Average Percentage of the Female Borrowers for Each MFI in the OPT



Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

Figure 4.4 presents the mean of the average loan balance per borrower of each MFI. From the figure, it clear that significant differences between the average loan balances per borrower given by each one of these institutions, where REEF has the highest average loan balance, while ASALA has the lowest.

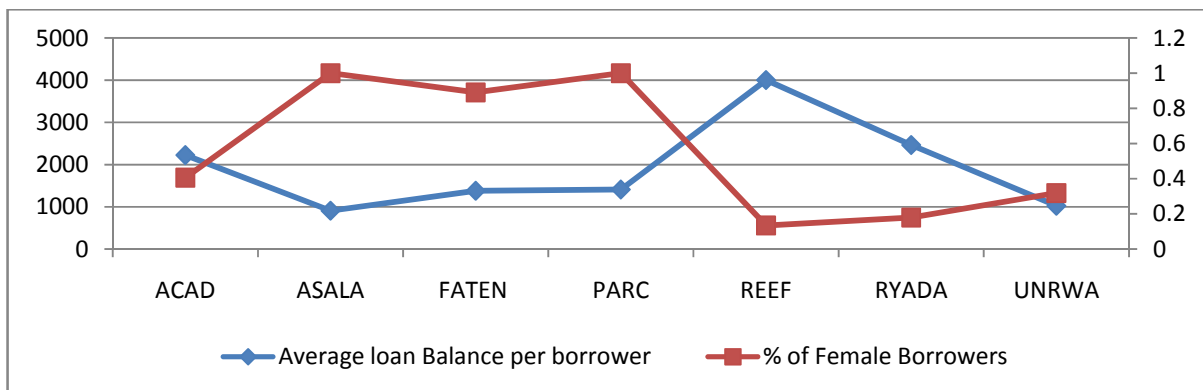
Figure 4.4: The Average Loan Balance per Borrower (USD) for Each MFI in the OPT



Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

Figures 4.3 and 4.4 show that MFIs that focus on lending females, usually have a lower average loan balance per borrower, and vice versa (this clearly illustrated in figure 4.5). This indicates that these MFIs differ in their adaption of the outreach goals. This is because lending more females and lending loans with low dollar's value (lowers average loan balance per borrower), means focusing more on outreach to poor. This might reflect an efficiency differences between these institutions. The direction of these differences is a target of this study, and whether the goals of outreach and efficiency are compatible or not.

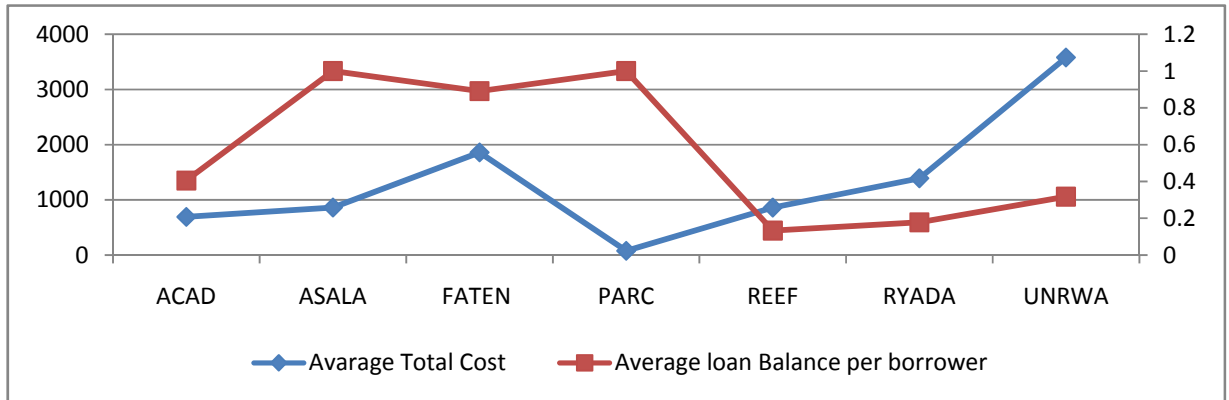
Figure 4.5: The Average Loan Balance per Borrower (USD) Versus the Percentage of the Female Borrowers per MFI in the OPT



Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

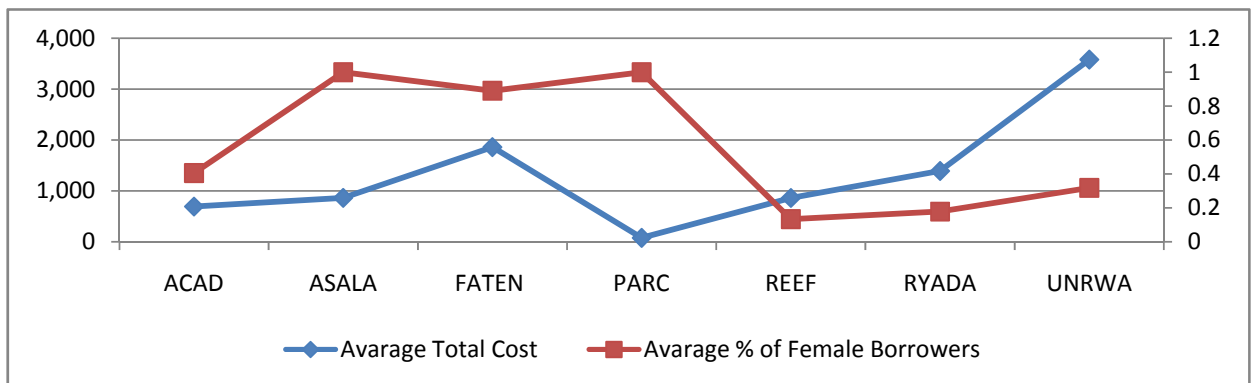
Figure 4.6 shows the relationship between the average total cost and the average loan balance per borrower. Figure 4.7 shows the relationship between the average total cost and the percentage of the female borrowers. It could be observed from these two figures that the higher the average loan balance per borrower (Figure 4.6), and the lower the percentage of the female borrowers (Figure 4.7), the lower will be the total cost. This might give an indicator to the tradeoff between the outreach and efficiency goals of MFIs working in the OPT. This is clear when looking at most of MFIs in the study sample (five institutions here), only two MFIs are thumping from this pattern (ASALAH and PARC) in Figure 4.6, and (PARC and UNRWA) in Figure 4.7.

Figure 4.6: Average Total Cost (Thousands USD) Versus Average Loan Balance per Borrower per MFI in the OPT



Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

Figure 4.7: Average Total Cost (Thousands USD) Versus Average Percentage of the Female Borrowers per MFI in the OPT

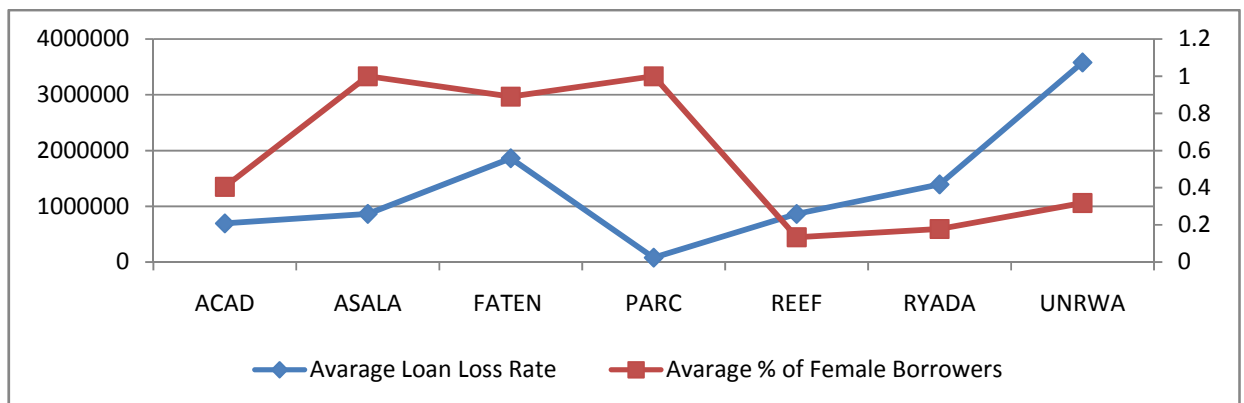


Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

Figures 4.8 and 4.9 show the relationship between the average loan loss rate and the percentage of the female borrowers, and the relationship between the average loan loss rate and the average loan balance per borrower, respectively. The figures show a

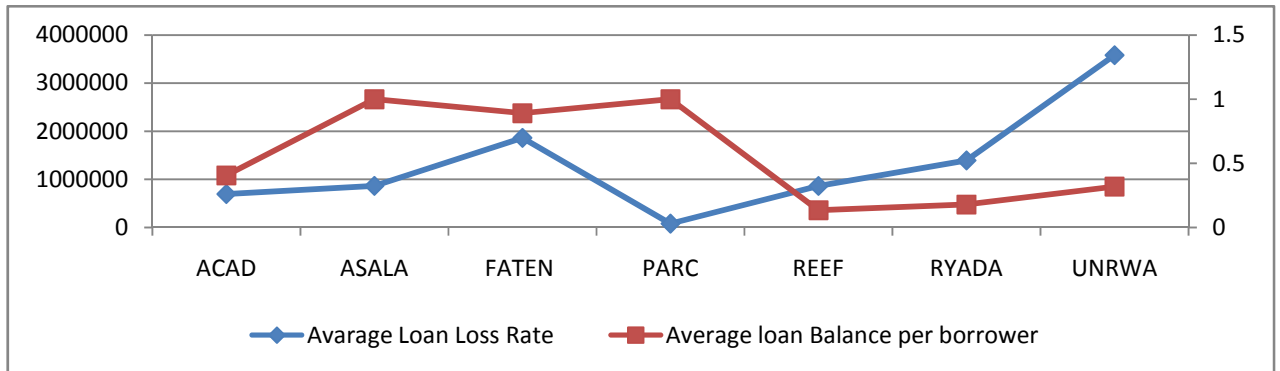
contradictory behavior between what is observed here, and what is previously observed in Figures 4.6 and 4.7. From figure 4.8, it can be concluded that the higher the percentage of the female borrowers, the lower will be the average loan loss rate. It can be concluded from Figure 4.9, however, that the higher the average loan balance per borrower, the higher will be the average loan loss rate. In other words, this might indicates that the higher the outreach, the higher will be the efficiency (since the lower loan loss rate means the higher the cost efficiency and the lower the credit risk).

Figure 4.8: Average Loan Loss Rate Versus Average Percentage of the Female Borrowers per MFI in the OPT



Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

Figure 4.9: Average Loan Loss Rate Versus Average Loan Balance per Borrower per MFI in the OPT



Source: Mix Market (2015), Cross Country Report, Palestine. <http://www.mixmarket.org/mfi/country/Palestine>. Last Access [Dec 04th, 2015]

Chapter Five: Empirical Results and Findings

This chapter presents and discusses the results from the stochastic cost frontier. The estimated model is then evaluated to determine whether these results fit the theory and the Palestinian context. In addition, the analysis helps in determining the variables that affect MFIs total costs, and analyzing the cost efficiency of MFIs according to different considerations. This chapter also analyzes the results of the inefficiency model and detects the nature of outreach-efficiency relationship, as well as the different set of control and dummy variables that may cause and raise the cost inefficiency of MFIs working in the OPT.

5.1 The Cost Frontier Estimates

Table 5.1 shows the parameters of the translog stochastic frontier cost function; these parameters were estimated by the maximum likelihood method, using the STATA software.

In order to answer research question (1), a null hypothesis which states that MFIs operating in the OPT are fully efficient will be tested against alternative hypothesis which states that these MFIs have some degree of inefficiency (not fully efficient). In stochastic frontier model, the null hypothesis can be expressed as $H_0: \hat{\lambda} = 0$ and the alternative hypothesis can be expressed as $H_1: \hat{\lambda} > 0$. In another words, a part of the error term is resulted from the inefficiency of MFIs. $\hat{\lambda}$ Could be defined as:

$$\hat{\lambda} = \sigma_{u2} / (\sigma_{u2} + \sigma_{v2}), \text{ and } 0 < \hat{\lambda} < 1.$$

To test the null hypothesis, a t-test is conducted here. Where $t^* = \hat{\lambda} / \text{se}(\hat{\lambda})$, $\hat{\lambda}$ is the maximum likelihood estimator of λ , and $\text{se}(\hat{\lambda})$ is the estimator of the standard error.

In this study, $t^* = 0.792/0.273$ equals to 2.9, which is greater than tabulated t-statistics $(t_{0.95}) = 1.96$. Therefore, the null hypothesis of full cost efficiency is rejected, and MFIs working in the OPT have some degree of inefficiency. Moreover, in this study, $\hat{\lambda} = 0.792$, which means that 79.2% of the variation in the composite error term $(u+v)$ is due to inefficiency component (u) , and the rest of variation (20.8%) is due to random (idiosyncratic) error term.

In order to answer research question (2), a null hypothesis which states that cost efficiency is constant overtime, is tested against the alternative hypothesis which states that the cost efficiency is changing (increasing or decreasing) overtime.

The null hypothesis is expressed as $H_0: \eta = 0$, which means that the inefficiency effect is time invariant. The alternative hypothesis is expressed as $H_1: \eta \neq 0$, which means that the inefficiency effect is time variant.

The $t^* = -0.22/0.0725$, equals to -3.03 is greater than tabulated t-statistics $(t_{0.95})$. Therefore, null hypothesis is rejected and the inefficiency effect is time variant. Moreover, the sign of eta (η) is negative, this implies that the cost inefficiency is increasing overtime, i.e. MFIs in the OPT are becoming less cost efficient.

Further analysis is required to determine the distributional form of the inefficiency effect. The null hypothesis indicates that the inefficiency effect has a half normal distribution, i.e. $H_0: \mu = 0$. While the alternative hypothesis indicates that the inefficiency effect has a truncated normal distribution, $H_1: \mu \neq 0$ (Goyal and Suhag, 2003). Using t-test, $t^* = 0.056/0.101$ equals to 0.554, is lower than critical t value ($t_{0.95}$). As a result, null hypothesis cannot be rejected and the inefficiency effect has a half normal distribution, i.e. the inefficiency term is independently and identically distributed, $u_i \sim iidN^+(0, \sigma_u^2)$.

The half normal distribution is considered as a special case of the truncated normal distribution. However, in panel data models, the inefficiency term can be estimated without making any assumption about the distribution of u_i . i.e., whether the inefficiency term has a half normal or truncated distribution, this will not affect the result of u_i analysis (Coelli et.al., 2005).

The stochastic cost frontier model is estimated using the operating costs as proxy of inputs price, and the gross loan portfolio as an output. As appear in table 5.1, the coefficients of operating costs and gross loan portfolio are positive and highly significant at 1% and 5% levels, respectively. The positive signs indicate an outward shift of the cost frontier. Hence, as operating costs and gross loan portfolio increase, total costs will increase, and vice versa. Before running the model, each variable in the cost frontier model (except the control variables) is divided by its mean, in order to estimate the elasticity (Coelli et.al., 2005).

The results of estimation of these parameters are consistent with the theory, since total costs are expected to increase as inputs prices increase (operating costs). Also, total costs are expected to increase as MFI increases and expands its operations, and gives more loans (this appears in the positive sign of the gross loan portfolio).

The value of operating costs coefficient is extremely high (around 0.99); this indicates that the largest changes in total costs are resulted from changes in operating costs. This supports our previous explanation of excluding financial costs from this model, as changes in financial costs do not show tangible changes in total costs. Finally, the interaction and the quadratic terms are also highly statistically significant. Noticing the negative sign of the quadratic term of the operating costs which is also significant, this means that the effect of operating costs on total costs is increasing but at a decreasing rate. Moreover, the sign of the quadratic term of the gross loan portfolio is positive; this indicates that output is increasing at increasing rate. That is because of the increasing operations of MFIs and increasing market size for these loans, due to the increased acceptance and approbation of receiving microfinance loans among people by time.

In the case of the control variables, the sign of Ln(ASSETS) variable is negative and statistically insignificant. Therefore, it can be concluded that MFIs size has no effect of their cost. The second control variable is loan loss rate (LLR), which has a

negative sign, and it is statistically insignificant. Thus, one would expect that LLR does not affect the MFI's cost. The last control variable in this model is return on equity (ROE). As mentioned earlier, this ratio is a measure of the commercial viability and performance. The sign of this variable coefficient is positive, which means that as MFIs management become more efficient and their viability increases, the total costs will increase. This contradicts with the theory and common sense in management, because it is expected that a higher management efficiency leads to a lower total costs. This variable is statistically insignificant, which indicates that the efficient management of MFI has a vital role in reducing the costs of MFIs.

The average cost efficiency for MFIs included in this study reached to 96.4%, during the study time period (1999-2014), with a minimum value of 83.3% and a maximum value of 99.7%. Table 5.2 shows that cost efficiency is decreasing over time¹⁶. During the early period of the study, the cost efficiency was extremely high (around 99%) in 1999 and 2000. Thereafter, it started to decline, but the level of the decline was very small. At the end of period, the cost efficiency reached to about 92%, and it still high. Besides, it is clear that the variation in cost efficiency was also increasing overtime. For instance, in 1999, where only two observations are available, the standard deviation was close to zero. By the passage of time, standard deviation started to increase, especially after 2006; it reached 0.066 in 2014. This may indicate that the cross-firms cost efficiency exhibits more differences. In other words, the

¹⁶ One way ANOVA test is conducted and the difference in these means is significant.

differences in the values of cost efficiency between MFIs are increasing overtime. This may be due to the focus of these MFIs on their own development, and on the ways that they must pursue to differentiate themselves from other MFIs in the market.

Table 5.1: Cost Frontier Function Parameter Estimates

| Variable | Coefficient | Std. Err. | t-statistic |
|---------------------------|-------------|-----------|-------------|
| Ln(OC) | 0.994*** | 0.018 | 55.39 |
| Ln(GLP) | 0.045** | 0.019 | 2.36 |
| 0.5*Ln(OC ²) | -0.014** | 0.067 | -2.13 |
| 0.5*Ln(GLP ²) | 0.026** | 0.010 | 2.55 |
| Ln(OC)*Ln(GLP) | 0.011* | 0.006 | 1.81 |
| Ln(ASSETS) | -0.018 | 0.023 | -0.75 |
| LLR | -0.00059 | 0.0008 | -0.73 |
| ROE | 0.044 | 0.057 | 0.79 |
| Constant | 0.227 | 0.384 | 0.59 |
| Mu | 0.056 | 0.101 | 0.56 |
| Eta | -0.22*** | 0.072 | -3.04 |
| Gamma | 0.792 | 0.273 | |
| sigma_u2 | 0.0063 | 0.010 | |
| sigma_v2 | 0.0016 | 0.0003 | |
| Log likelihood function | | 97.11 | |

***, **, and * indicate 1%, 5% and 10% significance levels, respectively.

In addition, the differences may also be explained by the competitions between MFIs. These factors were combined to increase the cost efficiency differences between MFIs overtime.

The trend of the decreasing cost efficiency is consistent with the result of Abdelkader et. al. (2014), who estimated the efficiency of MFIs in MENA region. The study found that the overall efficiency in the OPT and other MENA region countries is decreasing during the study timeframe (2006-2009)¹⁷.

The high cost efficiency of MFIs at the early period of study was resulted from the nature of their operations and their sources of fund. For instance, most MFIs during that period were depending heavily on donations and subsidies as sources of funds to start up and to continue their operations. By the passage of time, the MFIs started to develop their own entities and structures. In addition, regulations forced MFIs to find a sustainable source of fund. This creates additional costs on these institutions and reduced their cost efficiency.

A possible reason of the decreasing of the cost efficiency of MFIs in the OPT is due to deteriorated economic conditions, such as high inflation rates, high unemployment and poverty rates overtime, in addition of unstable political conditions, especially after the second intifada in 2000, and the Israeli invasion on Gaza strip many times during the study time period (2006, 2008, 2012 and 2014 attacks). These conditions

¹⁷ The lack of the research that studied the cost efficiency of MFIs in Arab countries makes it difficult to make a comparison between cost efficiency scores in the OPT and other Arab countries.

resulted from the destruction or the closure many projects and enterprises that were established by funds from microfinance. All of these factors increased the write off and the non-performing loans. All factors participated in increasing inefficiency of these institutions.

Furthermore, supervising and regulating MFI institutions by PMA impose extra charges on these institutions and hence their expenses (costs). Examples of regulations are; determination of the minimum capital requirements, and depositing a mandatory cash balance in PMA account, and paying different fees and commissions (PMA, 2012).

Table 5.2: Predictions of the Cost Efficiency Scores of MFIs Working in the OPT (1999-2014).

| Year | Mean | Standard Deviation | Minimum | Maximum | Number of Observation |
|-------------|-------------|---------------------------|----------------|----------------|------------------------------|
| 1999 | 0.994 | 0.00004 | 0.994 | 0.994 | 2 |
| 2000 | 0.992 | 0.00005 | 0.992 | 0.992 | 2 |
| 2001 | 0.990 | 0.00000 | 0.990 | 0.990 | 1 |
| 2002 | 0.988 | 0.00008 | 0.988 | 0.988 | 2 |
| 2003 | 0.985 | 0.00010 | 0.985 | 0.985 | 2 |
| 2004 | 0.986 | 0.00967 | 0.981 | 0.998 | 3 |
| 2005 | 0.984 | 0.00944 | 0.976 | 0.996 | 4 |
| 2006 | 0.980 | 0.01177 | 0.970 | 0.994 | 4 |
| 2007 | 0.963 | 0.03005 | 0.914 | 0.993 | 5 |
| 2008 | 0.962 | 0.03426 | 0.893 | 0.994 | 7 |
| 2009 | 0.950 | 0.04561 | 0.868 | 0.993 | 6 |
| 2010 | 0.959 | 0.03012 | 0.928 | 0.991 | 5 |
| 2011 | 0.949 | 0.03337 | 0.911 | 0.989 | 6 |

| | | | | | |
|--------------|--------------|----------------|--------------|--------------|-----------|
| 2012 | 0.963 | 0.03191 | 0.941 | 0.986 | 2 |
| 2013 | 0.961 | 0.03003 | 0.926 | 0.982 | 3 |
| 2014 | 0.922 | 0.06638 | 0.833 | 0.978 | 4 |
| Total | 0.965 | 0.03430 | 0.833 | 0.998 | 58 |

Table 5.3 shows cost efficiency scores for some selected years, classified according to the: legal form of MFIs, MFIs size, focus of MFIs on lending females, and grants status.

Table 5.3: Predictions of Cost Efficiency Scores of MFIs in OPT for Some Selected Years.

| Year ¹⁸ | MFIs Legal Status | | | MFIs Size | | Focusing on Female Lending | | Grants Status | |
|--------------------|-------------------|-------|-------|---------------------|-------|----------------------------|-------|---------------|-------|
| | NBFI | NGO | UNRWA | Large ¹⁹ | Small | Yes ²⁰ | No | Yes | No |
| 2006 | 0.978 | 0.984 | N/A | 0.982 | 0.977 | 0.977 | 0.982 | 0.989 | 0.97 |
| 2008 | 0.967 | 0.934 | 0.994 | 0.979 | 0.948 | 0.94 | 0.978 | 0.983 | 0.933 |
| 2009 | 0.96 | 0.868 | 0.992 | 0.974 | 0.925 | 0.905 | 0.972 | 0.982 | 0.917 |
| 2011 | 0.938 | 0.952 | 0.988 | 0.96 | 0.937 | 0.931 | 0.957 | 0.967 | 0.911 |
| 2013 | 0.973 | 0.926 | 0.982 | 0.977 | 0.926 | 0.926 | 0.977 | 0.96 | N/A |
| 2014 | 0.899 | 0.908 | 0.978 | 0.925 | 0.908 | 0.87 | 0.972 | 0.951 | 0.833 |
| Mean | 0.967 | 0.941 | 0.988 | 0.973 | 0.954 | 0.949 | 0.976 | 0.975 | 0.954 |

¹⁸ The selection criterion of these years is according to availability of data for each year.

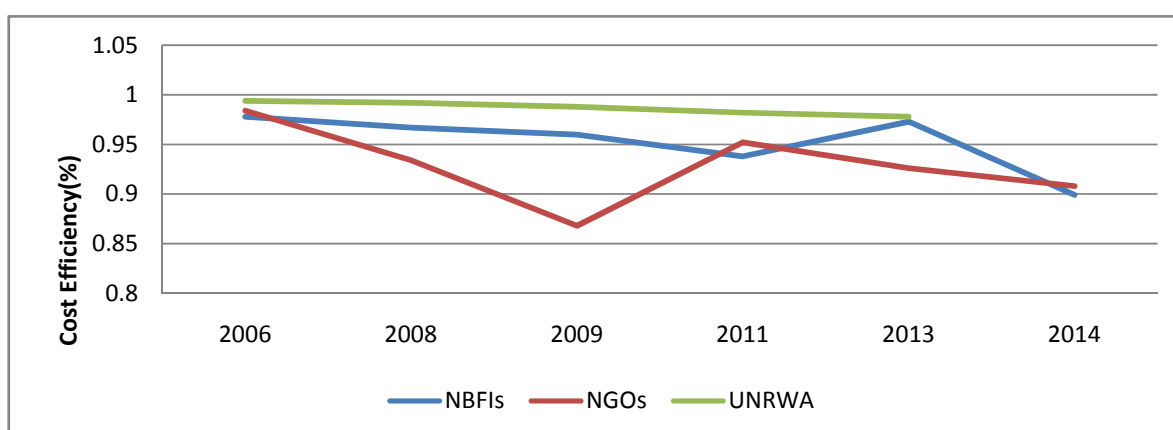
¹⁹ Large MFIs represent the three largest MFIs in the OPT: FATEN, RYADA, and UNRWA. The rest of MFIs were considered as small institutions.

²⁰ This classification was according to the percentage of the female borrowers for each institution, when this percentage is greater than 80%, then this MFI focuses on lending females.

According to the legal form of MFIs, UNRWA has the highest cost efficiency scores (98.8%), followed by NBFIs (96.7%). MFIs that are classified as NGOs show the lowest level of cost efficiency (around 94%). Moreover, the values of cost efficiency scores for NBFIs and NGOs are fluctuating overtime, and show a diminishing trend. On the contrary, UNRWA shows high and more stable cost efficiency scores overtime. These results are consistent with the results of Kipesha (2012), Abdul Qayyum and Quratulain (2014) who stated that MFIs with legal form of NBFIs show higher relative efficiency than NGOs.

Figure 5.1 illustrates the previous results, where NGOs show highest fluctuation and lowest values in cost efficiency scores, followed by NBFIs. On the other hand, UNRWA shows the highest and most stable cost efficiency scores.

Figure 5.1: The Cost Efficiency Scores of MFIs for Some Selected Years According to the Legal Form



One possible reason of the high efficiency of UNRWA is that UNRWA is the only institution in our sample that has zero financial costs throughout the study time period. Furthermore, being a part of large international agency offering different services (such as education, health, relief and social services, infrastructure and camps improvements), means that this agency has reached an optimal size to offer these services (including microfinance services) at the lowest possible cost, i.e. high cost efficiency.

As for MFIs size, average cost efficiency for large MFIs equals to (97.3%), which is greater than efficiency scores for small institutions (95.4%). This implies that larger MFIs are more cost efficient than smaller ones. This might reflect the fact that these institutions are benefited from economies of scale; i.e. as these institutions grow and increase their size, the average cost decreases and MFIs become more cost efficient. This finding gets along with Caudill et. al., (2009) who found that larger MFIs are more cost efficient than smaller MFIs.

Figure 5.2 shows cost efficiency scores of MFIs for selected years according to size of MFIs. The cost efficiency for larger MFIs is greater than that for smaller MFIs in most years.

Figure 5.2: The Cost Efficiency Scores of MFIs for Some Selected Years According MFIs Size

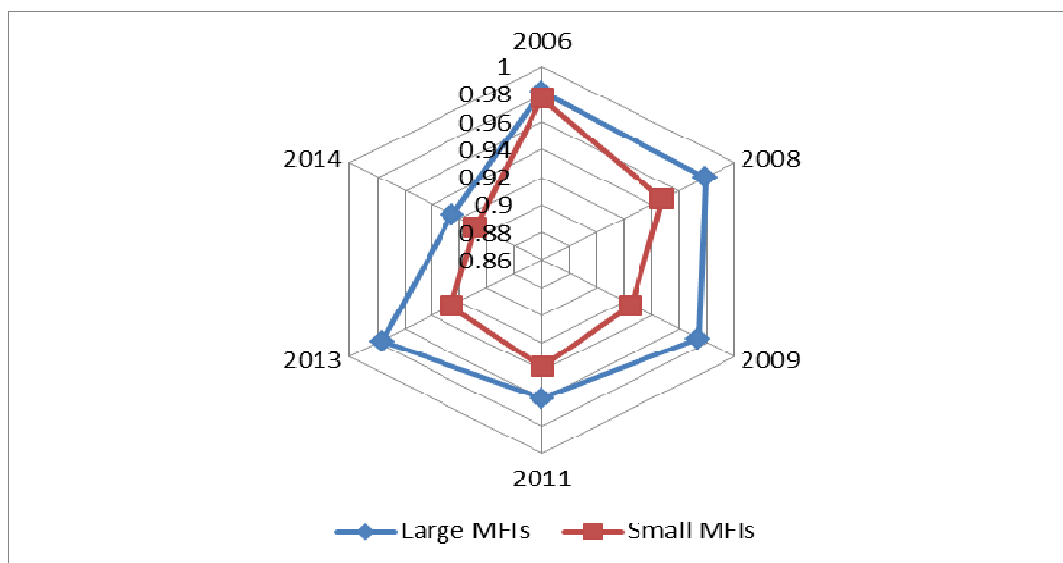
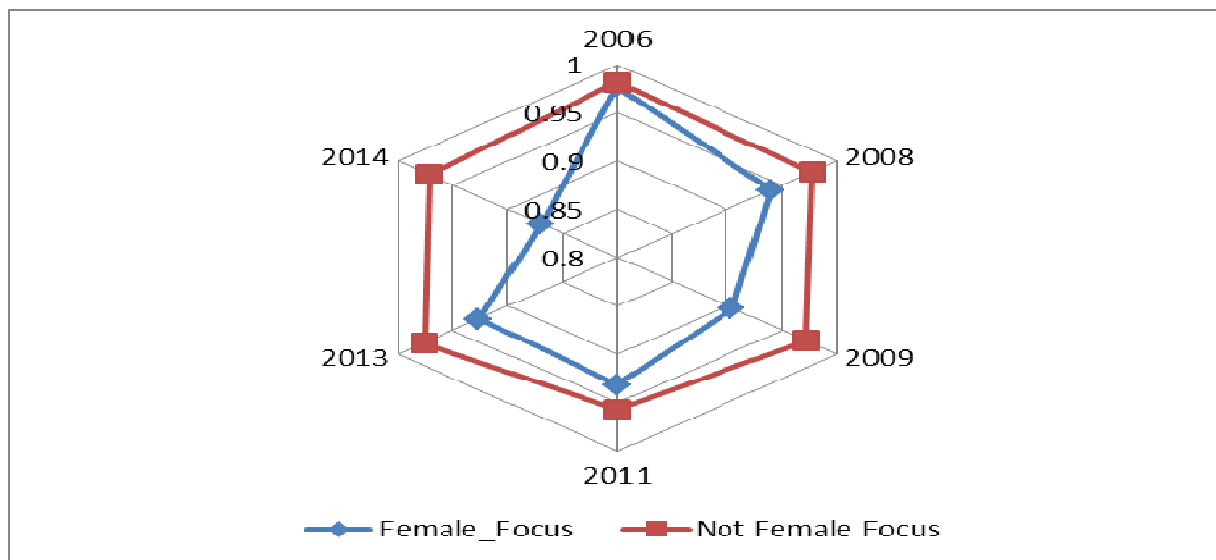


Table 5.3 also shows that the average cost efficiency for MFIs that focus on lending females is less than other MFIs. The average cost efficiency of MFIs focusing on females is (94.9%), while for other MFIs that do not focusing is (97.6%). The gender variable is explained more in details later.

Figure 5.3 shows cost efficiency scores of MFIs for some selected years according to target gender. The cost efficiency for MFIs that are focusing on lending females is less than other MFIs.

Figure 5.3: The Cost Efficiency Scores of MFIs for Some Selected Years According Target Gender



Finally, results show that MFIs that do not consider grants as main sources of fund have less cost efficient (95.4%) than MFIs that are mainly depend on grants to finance their operations (97.5%). This might be explained by the fact that subsidies allow MFIs to build an adequate and appropriate infrastructure to perform efficiently, and to develop the suitable know-how, as well as and building good experience (Armendariz and Morduch, 2005). Furthermore, MFIs that depend on grants usually have lower financial costs than other MFIs. This leads to increase cost efficiency of

these institutions. This result is consistent with Cull et. al. (2007), Hudon and Traca (2013), and Dlamini (2012)²¹.

Table 5.4 shows cost efficiency scores on the institutional level of MFIs. Information in the table shows that UNRWA has the highest cost efficiency (98.89%) during study timeframe, while PARC shows the lowest cost efficiency (89.19%). The table summarizes our previous results. The most efficient MFIs (UNRWA and RYADA) are amongst the largest three MFIs in the OPT. This result coincides with our previous conclusion of larger MFIs have higher cost efficiency than smaller ones. Furthermore, the information in table shows MFIs that focus on lending females have the lowest average loan balance (ASALA, FATEN, and PARC), and have the lowest cost efficiency scores. This also supports our previous conclusion of MFIs that focus on lending females have lower cost efficiency than other MFIs. In term of the MFIs legal form, UNRWA shows the highest efficiency scores, followed by NBFIs, while the MFIs that classified as NGOs (ASALA and PARC) show the lowest cost efficiency. Moreover, MFIs that do not depends on grants show lower cost efficiency scores than MFIs that depend on grants as a main source of fund.

²¹ Most studies conducted to find the efficiency effects of subsidies find out that there is a positive relationship between efficiency and receiving subsidies, but the relationship hold beyond a specific threshold, i.e. after this threshold, the subsidies effects start to show a negative relationship with MFIs efficiency.

Table 5.4: Average Cost Efficiency of MFIs in OPT

| MFI | Cost Efficiency | F | ALB | Assets | Legal Form | Depending on Grants |
|-------|-----------------|---------|-------|------------|------------|---------------------|
| ACAD | 96.56% | 40.55% | 2,224 | 3,980,196 | NBFI | No |
| ASALA | 95.75% | 99.97% | 906 | 4,248,878 | NGO | Yes |
| FATEN | 95.76% | 89.06% | 1,379 | 18,906,362 | NBFI | No |
| PARC | 89.19% | 100.00% | 1,409 | 3,865,859 | NGO | No |
| REEF | 96.24% | 13.37% | 4,000 | 6,947,240 | NBFI | Yes |
| RYADA | 98.58% | 17.84% | 2,461 | 12,502,771 | NBFI | Yes |
| UNRWA | 98.89% | 31.82% | 1,023 | 18,288,016 | OTHER | Yes |

5.2 The Inefficiency Model

After estimating the stochastic cost frontier and analyzing the cost efficiency, the next step is moving into defining the possible factors and variables that may create and influence MFIs inefficiency. The estimation results of inefficiency model specified in the previous chapter are reported in table 5.5. Ordinary Least square model (OLS) is used to estimate the determinants of cost inefficiency²².

Table 5.5: Inefficiency Model Parameters Estimates

| Variable | Coefficient | Std. Error | t-statistic |
|------------|-------------|------------|-------------|
| Ln(ALB) | 0.011*** | 0.0023 | 4.60 |
| F | 0.029*** | 0.0052 | 5.64 |
| Ln(ASSETS) | 0.0017 | 0.0019 | 0.90 |
| DER | 0.051*** | 0.0051 | 9.30 |

²² The standard errors in Tables 5.5 and 5.7 are adjusted for heteroskedasticity, serial correlation, and contemporaneous correlation. Stationarity tests are failed since they need a strongly balanced data.

| | | | |
|-----------------------|-----------|---------|-------|
| LLR | 0.0001 | 0.0003 | 0.47 |
| Age | 0.004*** | 0.0002 | 11.82 |
| NO_GRANT | 0.026*** | 0.0032 | 8.08 |
| Constant | -0.163*** | 0.0277 | -5.88 |
| Number of observation | | 58 | |
| Wald chi2(7) | | 1653.55 | |
| Prob> chi2 | | 0.000 | |
| R-squared | | 0.8034 | |

The dependent variable is the mean of the cost inefficiency.
 ***, **, and * indicate 1%, 5% and 10% significance levels, respectively.

The results presented in table 5.5 show that most variables included in the inefficiency model are statistically significant.

In order to answer research question (3), a null hypothesis which states that a higher ALB is associated with higher cost inefficiency of the MFIs, $[(H_1: \delta_1 > 0)]$, is tested against the alternative hypothesis which states that the higher ALB is associated with lower cost inefficiency of these institutions $[(H_0: \delta_1 < 0)]$. The rejection of null hypothesis may indicate the presence of trade-off between the outreach and efficiency.

A similar analysis is done here to answer research question (4), where a null hypothesis which states that lending more females will reduce cost inefficiency of MFIs $[(H_0: \delta_2 < 0)]$, is tested against alternative hypothesis which states that lending

more females will increase cost inefficiency of these institutions [$(H_1: \delta_2 > 0)$]. The rejection of the null hypothesis may also indicate the presence of trade-off between outreach and efficiency.

Analyzing the two outreach variables included in this study [the average loan balance per borrower (ALB), and the percentage of the female borrowers (F)], many conclusions are drawn. The sign of ALB is positive (do not reject H_0), and the sign of F is also positive (reject H_0). In other words, the sign of $\ln(\text{ALB})$ shows that the outreach and efficiency of MFIs are complementary goals; i.e., the lower average loan size, the higher will be the cost efficiency (or the lower cost inefficiency) and vice versa. This contradicts the prevailing belief that lending small dollar amount loans is usually associated with lending poorer clients, which creates additional costs on MFIs and reduces cost efficiency. This happens because the process of granting loans incurred different types of costs, including fields visits, screening, monitoring, and other administrative cost, which include a fixed cost portion. Lending to poor people, which usually contains low dollar amount loans compared to loans lent to less poor people. The fixed costs do not vary according to loan size. As a result, lending the poor is usually costly compared to lending to less poor. To conclude, the variable of average loan size indicates that the outreach and efficiency goals are complementary objectives for MFIs working in the OPT.

Borrowers' gender, represented by the percentage of females' borrowers, indicates that the higher percentage of the female borrowers, the higher will be the cost

inefficiency (lower cost efficiency). This variable indicates that trade-off exists between outreach-efficiency relationships. According to latest statistics on poverty and employment in West Bank and Gaza, unemployment rates between females exceed that are between men. Therefore, poverty rates between females are expected to leapfrog that are for men, and lending for females usually indicates that a higher depth of outreach is achieved.

These results are contradicting; while the first outreach variable Ln (ALB) states that the outreach and efficiency are complementary goals, the second outreach variable (F) states that there is a trade-off between these goals. In the Palestinian context, the low average loan size is associated with lending females. Therefore, a high collinearity is expected between these two variables and results are a biased estimation. Table 5.6 displays the Pearson correlation matrix for the variables in inefficiency model.

Table 5.6: The Pearson Correlation Matrix for the Inefficiency Model Variables

| | Ln(ALB) | F | Ln(ASSETS) | DER | LLR | Age | NO_GRANT |
|------------|---------|---------|------------|---------|---------|---------|----------|
| Ln(ALB) | 1 | | | | | | |
| F | -0.6496 | 1 | | | | | |
| Ln(ASSETS) | 0.1523 | -0.1203 | 1 | | | | |
| DER | 0.2717 | 0.0746 | 0.0054 | 1 | | | |
| LLR | 0.114 | -0.2443 | -0.3164 | -0.1732 | 1 | | |
| Age | 0.0026 | 0.1109 | 0.5425 | -0.0666 | -0.3251 | 1 | |
| NO_GRANT | -0.0779 | 0.2816 | 0.1835 | 0.0051 | 0.1702 | -0.1228 | 1 |

The collinearity between Ln (ALB) and (F) is high (around -65%). Therefore, one of these two variables will be excluded from the model.

Table 5.7 displays the estimation results of two models: model I which excludes (F), and model II which excludes Ln (ALB). It is obvious that Ln (ALB) variable is not statistically significant, while (F) variable is highly statistically significant at 1%.

This suggests that Ln (ALB) has no effects on MFIs cost efficiency, while (F) has a significant effect on this efficiency. Therefore, this study uses (F) as a determinant of the outreach-efficiency relationship, and model II is used to interpret the results.

Table 5.7: Estimation Results of Two Alternative Inefficiency Models

| Variables²³ | Model I | Model II |
|-------------------------------|-----------------------|----------------------|
| Ln(ALB) | 0.0001 (0.0025) | – |
| F | – | 0.015*** (0.0048) |
| DER | 0.058*** (0.0062) | 0.057*** (0.0053) |
| LLR | -0.00002 (0.0003) | 0.0002 (0.0003) |
| Age | 0.0038*** (0.0003) | 0.004*** (0.0006) |
| NO_GRANT | 0.032*** (0.0037) | 0.027*** (0.0004) |
| Constant | -0.053*** (0.018) | -0.055*** (0.005) |

²³ The variable Ln(ASSETS) is excluded from these two models because of its high collinearity with (AGE), which is around 54.3%. And since this study previously investigated the effect of size on MFIs cost efficiency, this variable was excluded instead of (AGE).

| | | |
|-----------------------|---------|---------|
| Number of observation | 58 | 58 |
| Wald chi2(5) | 1003.63 | 1207.09 |
| Prob> chi2 | 0.0000 | 0.0000 |
| R-squared | 0.7606 | 0.7822 |

The numbers in the brackets represent the standard errors.

***, **, and * indicate 1%, 5% and 10% significance levels, respectively.

From the analysis of model II, we can notice that lending more females increases MFIs cost inefficiency. This is due to a set of circumstances and conditions associated with females' borrowers of MF loans in the OPT. For instance, females who receive MF loans usually invest in low risk and low return projects (like homemade food products, traditional Embroidery). However, projects established by men are characterized by higher level of risk and higher return. Hence, the ability to repay the principle and the high interest cost charged on these loans will be lower for females, particularly when these projects fail, or if they could not bring an adequate return. Another possible reason for this trade-off is due to low financial experience and inadequate financial literacy among females, especially who are uneducated and live in rural areas. This will increase the failure rates of enterprises owned and managed by females.

Furthermore, some MFIs are established with an explicit objective of targeting females as a main target group of borrowers. This might be a result of that the main fund providers (granters or owners) are subordinated to some international agencies

that focus mainly on the advancement and the development of females condition in developing countries. As a result, microfinance loans are directly directed to females' borrowers regardless of their ability to manage their projects, or whether male borrowers are more effective in their management of borrowed fund.

In the light of our previous explanations, we can conclude that there is a trade-off between depth of outreach and cost efficiency in MFIs conducting their businesses in the OPT.

The analysis of the control and dummy variables in the inefficiency model shows that the variable of debt to equity ratio (DER) is positive and statistically significant. This means that the higher the DER, the higher will be the cost inefficiency. This result goes in alignment with the finding that high DER shows an evidence of poor financial management (Masood and Ahmad, 2010). Furthermore, MFIs that have higher DER pay higher financial costs, when compared to other MFIs with lower DER, and these financial costs are usually paid on commercial loans from banks. As a result, higher DER will lower the MFIs ability to reduce their cost, i.e., the higher cost inefficiency.

The variable (age) shows that older MFIs are less cost efficient than newer ones. This finding suggests that new MFIs gained the knowledge previously established by older institutions at the beginning of their lives. Furthermore, newer MFIs overcome the errors and the mistakes and cope difficulties faced by older MFIs, which increases their efficiency (Hermes et. al., 2011). Furthermore, Older MFIs are negatively

affected by the prolonged Palestinian-Israeli conflict than newer ones, which is definitely reduced their cost efficiency.

The dummy variable (NO_GRANT) means that the MFIs do not consider the grants as the main sources of fund. The sign of this variable coefficient is positive and highly statistically significant. This implies that MFIs which do not rely basically on receiving grants are less cost efficient than the institutions that depend on grants as a main source of fund. This result coincides with our previous analysis of cost efficiency.

Finally, loan loss rate (LLR), which is not statistically significant, means that LLRs do not have an impact on MFIs cost efficiency. This might be explained by the fact that loan loss rates of MFIs in the OPT is relatively low. Therefore, the expected effect of this rate is not significant.

Chapter Six: Conclusions and Recommendations

6.1 Conclusions

This study uses the stochastic frontier analysis as a statistical tool to investigate the cost efficiency of MFIs conducting their businesses in the OPT over the period 1999-2014. The stochastic cost frontier utilized here was proposed by Aigner et. al. (1977). The model is a modified version of Hermes et.al. (2011). It reflects the peculiarity of the environment in which MFIs operate. In particular, the modification on Hermes et. al. (2011) model was made by omitting financial cost from cost frontier and using only the operating cost as an input price. This adjustment made because MFIs working in the OPT pay a very low or no interest on their sources of fund, especially at early period of the study. Therefore, the cost frontier model is estimated using operating cost as an input price, and gross loan portfolio as an output.

The results of analysis show that the average cost efficiency of Palestinian MFIs over 1999-2014 is equal to 96.4%, with a minimum value of 83.3% and a maximum value of 99.7%. This efficiency has downward trend overtime. The study also analyzed the cost efficiency in term of the: legal form of MFIs, MFIs size, focus of MFIs on lending females, and grants status. The results show that UNRWA has the highest cost efficiency scores, followed by the institutions with legal form of Non-Bank Financial Institution (NBFIs), while Non-Governmental Organizations (NGOs) show

the lowest cost efficiency. The study also found that larger MFIs are more cost efficient than smaller ones, which means that these institutions are working in a situation of economies of scale. In terms of targeting females' borrowers, the average cost efficiency of MFIs that focus on lending females is less than other MFIs. Finally, the study found that MFIs that do not consider grants as a main source of funds, are less cost efficient than MFIs that depend mainly on grants to finance their operations.

In term of the outreach-efficiency relationship, two variables were used to detect the nature of this relationship; the average loan balance per borrowers and the percentage of the females' borrowers. The average loan balance per borrower does not affect MFIs cost efficiency. However, the percentage of the females' borrowers variable is used to detect the direction of this relationship.

This study also found out that there is a trade-off between these two goals. Focusing on lending more females (more depth of outreach), increases cost inefficiency and the lower the ability of MFIs to minimize their cost.

Indeed, this result revealed the problem of "Mission Drift" that could face these institutions. Mission drift means that MFIs deviate from their mission of poverty alleviation and females' empowerment in account of their cost efficiency. This result was expected since MFIs working in the OPT charge a very high interest rates on their loans, where the majority of interest revenue tend to cover operating costs of MFIs. These high interest rates contradict the goal of targeting the poor, since these

poor definitely would not be able to repay the loan principle and its high interest expense. This will be particularly true when these loans are not employed in a productive enterprises, or if these enterprises fail or made losses.

The study also found that the higher debt to equity ratio (DER), the lower will be cost efficiency. This result may give an indicator to poor financial management. Furthermore, results show that older MFIs are less cost efficient than newer ones, but the loan loss rate (LLR) has no significant impact on MFIs cost efficiency. Finally, the results show that MFIs that depends on grants as a main sources of fund are more cost efficient than other institutions.

6.2 Recommendations

According to the findings of the study, a set of recommendations could be proposed here:

- 1- Improving the cost efficiency by reducing operating costs facing MFIs. This is feasibly by adopting technologies for screening and monitoring potential borrowers.
- 2- Small MFIs will be better off by increasing their size through granting more loans, opening new branches, or merging with other MFIs in the market. This will help in exploiting economies of scale. Moreover, opening more branches will widen the scope these institutions to reach new and larger segment of clients, this in turn increases their efficiency.

- 3- Improving the selection mechanism of females' borrowers, and giving them a sufficient training to enable them to start and manage their enterprises successfully. Furthermore, increasing the feasibility studies for their enterprises to assess the probability of success.
- 4- MFIs are advised in engaging in developing and enhancing risk management strategies, and increase the non-performing loans reserve, to reduce the impact of the political and economic problems on MFIs cost efficiency.
- 5- As supervisory and regulatory body on MFIs, the PMA could put instructions to increase the awareness of these institutions on increasing the depth and the breadth of outreach.

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