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1. Introduction

A microfinance institution (MFI), in general, is an institution that can create financial inclusion for the poor, improve household welfare and reduce poverty (Littlefield et al., 2003, Berhane and Gardebreek, 2011). An MFI is a flexible institution that can easily adjust to the needs of local people, especially the poor (Ahmad and Ahmad, 2009). There are many types of MFI, such as non-governmental organizations, rural banks, village banks, and cooperatives (Karim et al., 2008). However, the main problem with formal financial institutions (e.g., banks) is that they demand specific requirements such as collateral, land and wealth, before granting credit (Li et al., 2011a). These requirements are major obstacles against the rural poor obtaining finance to support their livelihood. Access to finance is important and has severe economic and social impacts, especially on the rural poor. The social impacts include better education, health and housing for the poor (Hermes and Lensink, 2011).

Indonesia, an agricultural country with the world's largest Muslim population, faces severe poverty problems. In 2014, over 28 million Indonesians lived below the poverty line, i.e., 11.3% of the population (The World Bank, 2015). Islamic MFIs are financial institutions that provide financial access for poor people in rural areas and follow Islamic principles in their operation. Islamic MFIs can play a significant role in addressing rural poverty alleviation predominantly dominated by agricultural activity. The principle of Islamic MFIs, i.e., avoiding the use of interest, is an advantage in a Muslim majority country like Indonesia. Moreover, institutions that have *shari'a* compliance financial products can cater to the needs of traditional Muslim households in rural areas. Islamic MFIs can combine their products with charity-based funds raised from *zakah*¹ and *sadaqa*² that enable them to distribute funds to the poorest to help them to overcome poverty (Kaleem and Ahmed, 2009, Ahmad, 2002).

Islamic MFIs have grown rapidly in recent decades. Islamic MFIs have particular Islamic values that could be a solution for poor people, especially in rural areas, who are averse to borrowing, in part, because of their religious beliefs (Ahmad and Ahmad, 2009). The principles of Islamic microfinance are derived from Islamic law (Seibel and Dwi Agung, 2006). Islamic law specifies a financial contract without charging interest (*riba*) (Rahman, 2010a). Islamic MFIs provide financing products such as equity financing with profit and loss sharing mechanism (PLS) and debt-based financing products (non-PLS) (Dhumale and Sapcanin, 1999).

¹ Compulsory charity for Muslim (if their wealth exceeds the condition (nisab), equal to 85 grams of gold and held for a year (Haul)).

² Optional charity.

The development of Islamic finance institutions in the modern era started with the establishment of an Islamic bank in the Middle East in the 1960s (Ainley et al., 2007). The combination of Islamic finance and microfinance was first discussed in depth by Rahul and Sapcanin in 1999 (Akhter et al., 2009). Based on a study by Abdouli (1991), there are three basic Islamic finance contracts that could operate in an MFI to build successful microfinance programmes: *mudarah* (profit-sharing), *musyarakah* (joint venture) and *murabahah* (cost plus mark-up). *Mudarah* and *musyarakah* are equity financing whereas *murabahah* is debt-based financing.

In Islamic finance, equity financing based on PLS is distinguished from conventional finance (Azmat et al., 2015). Several studies have attempted to explain the benefit of equity financing in Islamic finance. However, very few empirical studies investigate the impact of Islamic equity financing on rural households' welfare. This paper aims to investigate the impact of equity and debt-based financing by Islamic microfinance and identifies which financing method has the greater impact on rural household welfare. This study also aims to analyse the *shari'a* compliance of Islamic MFIs' contracts based on the national *shari'a* board of Indonesia.

Using double difference-in-difference (DD) model, fixed effect regression, and two-year panel data set, the results indicating that equity financing has more positive impact on rural household welfare compare to debt-based financing especially on the change in income. This paper bridges the gap from previous literature in Islamic finance especially on identify the empirical impact from two financing mechanism in Islamic MFI; equity and debt-based financing.

The paper is organised as follows: Section 2 provides a description of characteristics of Islamic MFIs. Section 3 discusses the principles of Islamic microfinance. Section 4 provides the literature review of the paper. Section 5 discusses the methodology used to measure the impact of financing between equity and debt-based financing. Section 6 describes the data collection. Section 7 analyses the findings and provide discussions. Section 8 concludes the paper.

2. Characteristics of Islamic MFIs

According to Addae-Korankye (2012), microfinance provides financial services for poor people which are excluded from the formal financial sector such as banks. Microfinance covers financial products including savings, loan, and insurance. There are many types of MFIs worldwide, Table 1 presents most of the available types of microfinance globally. The first type of microfinance is project based, which is mostly funded by donors and is temporary. In general, the aim of such microfinance is to promote financial access to low income people and micro enterprises such as the microfinance development project by The World Bank in Morocco and Russia (The World Bank, 2013).

Non-profit organizations (NGOs) are another type of microfinance that mostly lack a legal framework. They cannot accept savings but, in certain cases, they can offer a savings product, example of this type is Opportunity International in Australia (Opportunity

International, 2015). A cooperative is another type of microfinance where the ownership belongs to its members. It has savings and credit services for members, example for this type is Koperasi Simpan Pinjam (KSP) in Indonesia (Lapenu and Pierret, 2006).

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[Insert Table 1 here]

A private company is a type of microfinance that consists of private and public capital. Private capital can be local (such as local banks, clients, and employees) and international (such as commercial banks, social investment funds, private commercial funds, etc.) A private company can also be structured with public capital from the local or national government, examples of this type are RDS Islami Bank Bangladesh Limited (IBBL) and Grameen Bank in Bangladesh (Rahman and Ahmad, 2010, Grameen Bank, 2015). A public entity is owned by the government or state and can be a shareholder company with shares owned by the public. This type of microfinance is governed by special laws or banking laws, the example of this type is Cajas in Municipales, Peru (Lapenu and Pierret, 2006, Gallardo, 2001, Mukherjee, 1997).

The sustainability and effectiveness of microfinance not only depends on its type, but also depends on the culture of the country. Some types of microfinance need special support to succeed, such as cooperatives or transformed NGOs (Seibel, 2005). For instance, special support in the form of effective regulation and supervision from an authorized party is needed to resolve issue on the effectiveness of members' control in cooperatives (Seibel, 2005).

Islamic MFIs differ from conventional MFIs. Islamic MFIs' products and services must be free from certain elements forbidden in Islam (Obaidullah, 2008, Chong and Liu, 2009). The forbidden elements preclude Muslims being involved in non-halal business activities, such as alcohol, pork and prostitution. Secondly, engaging in *riba* or interest is not allowed in Islam. Thirdly, *gharar* (uncertainty/ lack of information disclosure) and *maysir* (gambling) are prohibited (Chong and Liu, 2009). Most Muslim scholars define *riba* as the premium that must be paid by the borrower to the lender along with the principal amount as a condition for the loan or for an extension of the loan's maturity (Chapra, 2006). An example of *gharar* is the sale of fish in a pond without any details such as quantity and quality, which may lead to uncertainty for the buyer (Chong and Liu, 2009).

Islamic MFIs are allowed to generate profit through two financing mechanisms, equity financing and debt-based financing. In equity financing, Islamic MFIs share the profit with their clients since two, or more, parties are involved in a profit-sharing agreement whereby the parties share their resources in a project and generate a return based on a pre-agreed ratio (Akhter et al., 2009, Abdul-Rahman et al., 2014). The other way to generate a profit is from debt-based financing, which is a non-PLS agreement. Islamic MFIs may earn a margin or fee from debt-based financing (Shahinpoor, 2009).

Maintaining *shari'a* compliance is important for any Islamic financial institution, including Islamic MFIs. With regard to *shari'a* compliance, there are standards from international organisations such as the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) and, in Indonesia, there is the national *shari'a* board of Indonesia which sets *shari'a* standards for all Islamic financial institutions in this country. Each Islamic financial institution also has a *shari'a* board to monitor and evaluate the

shari'a compliance of the institution. This board is evaluated and monitored by the national *shari'a* board of Indonesia.

3. The principles of Islamic microfinance

There are two financing principles in Islamic microfinance. The first is equity financing which uses PLS mechanisms such as *mudarah* and *musyarakah*. The second principle is debt-based financing which uses non-PLS mechanisms. Popular contracts under this type of financing are *murabahah* and *ijarah*.

a. Equity financing

According to Dusuki and Abdullah (2006), the ideal financing model for Islamic microfinance is equity financing. However, equity financing is less popular than debt-based financing (Paul and Presley, 1999, Chong and Liu, 2009). The first reason is the moral hazard problem associated with the ex-post information asymmetry, which is more likely to occur with an equity financing contract. The entrepreneur (the one receiving finance) has an incentive to manipulate the profit report (reduce the profit). The moral hazard problem can also occur in a *mudarah* (profit-sharing) contract because entrepreneurs can undertake high-risk projects whereby they gain profit and bear no losses from the business (Chong and Liu, 2009). PLS contracts expose institutions to business risk since most Islamic MFIs act as intermediaries that are not involved in the management of the projects (Ibrahim and Mirakhor, 2014).

Equity financing with a PLS contract represents the true spirit of Islamic microfinancing, which differs significantly from the conventional interest-based system. Asutay (2007) argues that equity financing and PLS contracts are the solution to achieve justice and equality and meet not only the *maqasid al-shari'a* (objective of *shari'a*), but also the objectives of Islam. This is because, in these contracts, both parties share the profit or loss based on a pre-agreed ratio instead of a fixed return; it is a unique and attractive feature of Islamic microfinance (Azmat et al., 2015, Chong and Liu, 2009, Ibrahim and Mirakhor, 2014).

Equity financing with a PLS contract is mainly based on *mudarah* (profit-sharing) and *musyarakah* (joint venture). A *mudarah* contract is a profit-sharing agreement where the Islamic MFI provides all the capital needed in the business or project and the clients give their effort and time to the project. The profits are shared in a fixed ratio and losses are borne by the Islamic MFI. A *musyarakah* contract is a PLS agreement where two or more parties contribute their equity to a project and profits are shared based on an agreement and losses are shared on an equity participation basis. This is similar to a joint venture agreement (Dhumale and Sapcanin, 1999, Chong and Liu, 2009).

b. Debt-based financing

The common model of financing in Islamic microfinance is debt-based financing (Aggarwal and Yousef, 2000, Asutay, 2007, Dusuki and Abdullah, 2006). Debt-based

financing with non-PLS contracts are *murabahah*, *bai' salam*, *ijarah wa iqtina'*, and *qard al hasanah*. *Murabahah* is a contract used for short-term financing. Under this contract, the seller discloses the real cost and profit of the products to the buyer. Negotiation of a profit margin is possible and instalment payments are common. A *bai' salam* is a contract similar to a forward contract. Under this contract, the seller and the buyer agree to a future transaction whereby the buyer pays the full amount of the price and the seller promises to deliver the goods. The quality, quantity, price, and time of delivery are determined at the time of the contract signing (Dhumale and Sapcanin, 1999, Obaidullah, 2008).

Ijarah wa iqtina' is a lease transaction consisting of *ijarah* (pure leasing) and *ijarah wa iqtina'* (lease and purchase). In a lease and purchase contract, a portion of each regular payment is applied to the purchase of the goods and the goods are transferred to the buyer at the end of a period. *Qard al hasanah* is the only loan permissible under Islamic finance concepts. This contract is a zero return loan. However, administration and transaction costs are permissible (Dhumale and Sapcanin, 1999, Obaidullah, 2008). Islamic MFIs may maximise debt-based financing contracts to help rural households. *Murabahah*, for instance, can be used to purchase and resell commodities in rural areas (Wilson, 2007). *Ijarah wa iqtina'* can be applied to the lease of equipment or fields to a rural client. *Bai' salam* is appropriate for farmers and traders in agricultural areas. Finally, *qard al-hasanah* is suitable for new entrepreneurs to start their business (Wilson, 2007, Rahman and Rahim, 2007, Obaidullah, 2008).

4. Literature review

There are few studies that focus on measuring the impact of Islamic microfinance on rural households. For example, Samer et al. (2015) study measures the impact of Malaysian microfinance, Amanah Ikhtiar Malaysia (AIM), on urban and rural household income. The authors surveyed 780 women in two Malaysian provinces, Selangor and Melaka, to measure the impact of AIM on changes in household income. They divided their sample into four groups including old members from urban Selangor and Melaka, new clients from urban areas, old members from rural Selangor and Melaka, and new clients from rural areas. Their multinomial logit analysis reveals a positive impact of microfinance on household income especially for old members. Finance from AIM also has a positive impact on poverty reduction, especially in rural areas (Samer et al., 2015).

A study by Rahman (2010b) measured the impact of an Islamic microfinance programme in Bangladesh on rural poverty alleviation. Rahman's study shows that, after joining the Rural Development Scheme (RDS) (a *shari'a* micro-finance programme) in Bangladesh, Islamic microfinance clients' family income increased by over 33%; the clients' religious activities increased by around 21%; and the clients' business knowledge and communication skills increased by 72% and 79%, respectively. These results imply that Islamic microfinance not only positively impacts clients' income but it also has a positive impact on clients' attitudes (religious activities), knowledge (business) and skill (communication).

Rahman (2010b) also identifies several factors that influence the income generating activities of clients such as: (1) age; (2) education; (3) asset holdings; (4) land size; (5) family labour; (6) rural infrastructure; (7) skill-building training; and (8) morality and ethics. The author uses ordinary least squares and logit regression to estimate the impact of the Islamic microfinance programme on various economic outcomes in Bangladesh. The logit model was used to predict the probability of increasing the welfare level of Islamic MFIs' clients. The study measures the improvement in economic welfare as well as in moral and ethical principles. The author reveals that the Islamic microfinance programme improves clients' religious behaviour such as praying and fasting, and it increases household income, the productivity of crops and livestock, expenditure and employment.

Adnan and Ajija (2015) investigated the impact of Islamic microfinance on rural households in Indonesia. The authors focus on the effectiveness of Islamic microfinance in reducing poverty. Their sample comprised clients from one Islamic MFI, namely BMT MMU Sidogiri, in East Java, Indonesia. Poverty measurement indicators such as Headcount Index, Gini Index, Sen Index, and the Foster-Greer-Thorbecke Index were used to measure the impact of Islamic MFI financing. Their study concludes that most clients can increase their income after receiving financing from BMT MMU; the income increased between 50% from IDR 1,097,700 to IDR 1,669,100. BMT MMU Sidogiri's financing in 2015 was able to reduce the number of respondents below the poverty line by 22.5 per cent, reduce the poverty gap ratio from 24 to 11.3 percent and reduced the severity of poverty from 0.187 to 0.079 (Adnan and Ajija, 2015, Riwijanti and Asutay, 2015).

Limited studies have investigated two financing mechanisms in Islamic MFIs; equity and debt-based financing. According to Aggarwal and Yousef (2000), Dusuki and Abdullah (2006) and Asutay (2007), the common model of Islamic financial institutions (IFIs) financing is debt-based financing (e.g., *murabaha* and *ijarah wa iqtina'*). However, Dusuki and Abdullah (2006) argue that the ideal model for an IFI is the PLS mechanism. The PLS represents the true spirit of the Islamic finance and religious concept, which differs significantly from the conventional, interest based system (Dusuki and Abdullah, 2006). There is a debate among scholars which model is better, equity or debt-based financing. Equity financing, with a profit and loss sharing mechanism, is also important in distinguishing Islamic financial institutions from conventional financial institutions because, in equity financing, both parties share the profits and losses based on a pre-agreed ratio instead of a fixed return. This is a unique and attractive feature of Islamic finance (Azmat et al., 2015, Chong and Liu, 2009, Ibrahim and Mirakhor, 2014).

5. Methodology

This study uses rural households' annual income and expenditure as welfare indicators. Welfare impact assessment in a microfinance programme usually employs average household outcomes such as income and consumption/expenditure (Islam and Harris, 2008, Li et al., 2011b). Impact assessment in this study involves three groups of Islamic microfinance clients: clients with equity financing contracts; clients with debt-

based financing contracts; and non-clients. A major problem with impact assessment is selection bias. This issue can be overcome with the panel data model (Li et al., 2011b).

The double DD approach is used in this study to measure the impact of financing by Islamic MFIs through equity financing and debt-based financing contracts. DD is a popular economics method to identify the impact of treatments in the absence of pure experimental data (Li et al., 2011b, Athey and Imbens, 2006, Lee, 2016). The method requires two periods, one before treatment and one after treatment (Lee, 2016). The first group in this study is the client group which consists of clients with equity financing or debt-based financing contracts. Clients with equity financing and debt-based financing are rural households that received financing from Islamic MFIs. The second group are rural households (non-clients) that did not receive financing from Islamic MFIs (Li et al., 2011b, Athey and Imbens, 2006).

The standard DD model is illustrated by the following regression equation:

$$Y_{it} = \beta_0 + \delta_0 d_{2t} + \beta_1 P_i + \gamma M_{it} + \varepsilon_i \quad (1)$$

Where Y_{it} is a rural household outcome in natural logarithm form for rural household i at period t . The rural household annual income and expenditure are examples of household outcomes. The time dummy variable is represented by d_{2t} in which $t = 2$ means the post-financing period and $0 = 1$ means the pre-financing period. P_i is a group dummy variable equal to one if the rural household i is a client that obtained finance from an Islamic MFI and zero otherwise. M_{it} is an interaction between d_{2t} and P_i , which is equal to one if the rural household i obtains finance, is a client of an Islamic MFI and the observation takes place in the post financing period, zero otherwise (Li et al., 2011b). This research follows the framework in Kondo et al. (2008) and Li et al. (2011b) with an adjusted standard DD model adding the area/village attributes, observable rural household characteristics with fixed effect estimation. Fixed effect is used in this study because the household specific effect is more than the individual effect. Fixed effect is also used to control for unmeasured household and village attributes, which can resolve selection bias at the household and village level (Li et al., 2011b, Islam and Harris, 2008).

The adjusted DD model is:

$$Y_{it} = \beta_0 + \delta_0 d_{2t} + \alpha X_{it} + \gamma M_{it} + h_{it} + u_{it} \quad (2)$$

Where X_{it} is the rural household's characteristics. In this study, we used major loss (ML), which is the loss experienced by rural households during the financing period that affected their income and expenditure (e.g., natural disaster or crop failure). M_{it} is the treatment variable that refers to financing by Islamic MFIs, h_{it} is rural households' fixed effects, that is, unobserved households' individual or specific effect, u_{it} is idiosyncratic error, δ_0 is the time suffered for both groups (treatment and control), γ is the main parameter that explains Islamic MFIs' financing impact on rural households, Y_{it} is the same as in equation (1) (Li et al., 2011b, Athey and Imbens, 2006, Abadie, 2005).

[Insert Table 2 here]

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6. Data collection

a. Survey area and data sources

Data for the study were collected using a survey questionnaire administered to rural households from November 2014 to February 2015 in East Java, Indonesia. The province's population was about 38.36 million in 2013. Based on the data from the Ministry of Cooperatives and Micro and SMEs' of Republic of Indonesia (2013), about 32.46% of formal MFIs in Indonesia are in East Java.

Our study used a two-year rural household panel data set (2012/2014) to estimate the impact of equity financing and debt-based financing contracts by Islamic MFIs. The double standard DD and adjusted DD model measure the impact on the rural households' income and expenditure as well as welfare outcomes.

b. Sample selection

This study investigates clients of formal Islamic MFIs that are under the supervision of the Ministry of Cooperatives and Micro and SME's of the Republic of Indonesia. The formal Islamic MFIs in Indonesia are Islamic Financial Services Cooperatives (KJKS) and Islamic Financial Services Units (UJKS). In 2012, there were over 4,000 KJKS and UJKS and 700,000 clients in Indonesia (Sugianto, 2012).

We interviewed rural household members using convenience sampling because it is difficult to obtain a complete mailing list of Islamic MFIs' clients. The technique is also suited to finding respondents who are suitable for the research (Quinlan, 2011). The samples were selected from four Islamic MFIs in East Java, Indonesia. East Java comprises 29 regencies and 9 cities; the samples in this study are from three regencies in East Java.

Considering the large geographic area and budget constraints, this study interviewed 548 respondents with 414 questionnaires useable for data analysis. The response rate is 75.5%; the results represent only the sample of the study. This study uses the Yamane Taro sample formula to determine the study sample size (Israel (1992). The sample size formula for an unknown population is $n_0 = Z^2pq / e^2$ and for a finite population is $n = n_0 / (1 + ((n_0 - 1) / N))$. This study uses a 95% confidence interval ($Z = 1.96$), $p = 0.5$, $e = 0.05$ and $N = 762,000$. Based on these assumptions, we obtain a sample size of 384. However, 548 respondents were interviewed to allow for incomplete responses. Although this study only covers 3 of 29 regencies it is still a significant contribution to the literature because to date no empirical study evaluates the two financing mechanisms in Islamic MFIs. The study identified 112 clients with equity financing contracts and 162 clients with debt-based financing contracts. There are 140 non-clients in the study as a control group.

This study used data on Islamic MFIs' clients who started their financing at the end of 2013. This is to address the issue of Ashenfelter's dip. Ashenfelter's dip, sometimes

called a 'pre-programme dip' is defined as a drop or decline in earnings of individuals or households before a programme starts that compromises the DID results (Heckman and Smith, 1999). To solve the problem of Ashenfelter's dip, Bergemann et al. (2005) suggest not to use individual or household earnings data that are close to the start of the programme or treatment. This requires the initial time period to be set early enough in order to avoid the dip (Perry and Maloney, 2007, Li et al., 2011b). This study uses data on the income and expenditure of respondents from a year before the treatment started (pre-treatment period). Income and expenditure data in 2014 are post-treatment period.

7. Empirical results and discussion

a. Respondents' characteristics

Table 3 summarises respondents' general characteristics. The clients are divided into two groups, clients with equity financing and clients with debt-based financing contracts. The survey results indicate that most clients are male (63.9%), but most non-clients are female (57.1%). Over a third of clients (37.6%) are in the 36 - 45 years old group but for non-clients the dominant group is 26 - 35 years old (36.4%). Most respondents are Muslim; Muslim clients account for 98.5% with small proportions of Protestants (1.1%) and Roman Catholics (0.4%). Similarly, for non-clients, 97.9% are Muslim and 2.1% protestant.

With regard to education level, 38.9% of clients completed high school compared with 39.3% of non-clients. In terms of financing by Islamic MFIs, clients received financing of between 1,000,001 and 3,000,000 IDR³ (26.4%), and between 3,000,001 and 5,000,000 (25.3%) rupiahs. These groups are followed by clients receiving over 15,000,000 IDR (16.3%), 7,000,001 to 15,000,000 (15.5%), and 5,000,001 to 7,000,000 (12.0%). Only a small portion of clients received less than 1,000,000 IDR (4.5%).

Most clients (96.7%) need collateral to obtain financing by Islamic MFIs. Three financing contracts were identified in the survey; most clients have a *murabahah* contract (52.2%) followed by the *mudarabah* (40.9%) and small portion with a *qard* contract (6.9%). The *mudarabah* contract is the only equity financing contract identified in the survey; there is debt-based financing with *qard* and *murabahah* contracts. Some clients (26.2%) experienced a major loss during the financing period that affected their income and expenditure.

[Insert Table 3 here]

b. Shari'a compliance

Using a 7 point Likert scale (1 = strongly disagree, 7 = strongly agree), respondents were asked about *shari'a* compliance standards (based on the national *shari'a* board of

⁴ In July 2017, 1 USD equaled 13,318 IDR (Indonesian rupiah).

Indonesia) and their financing experience. The minimum score implies that financing from Islamic MFIs is not compatible with the national *shari'a* board of Indonesia standards and the maximum score indicates that clients received financing that is compatible with those standards. Table 4 shows clients' average score for *shari'a* compliance with a *murabahah* contract are 4.93 for the first statement and 5.87 for the second statement. Clients' average scores for a *qard* contract are 5.83 and 6.16, and the average scores for clients with a *mudharabah* contract are 5.02 and 5.34 (see Table 3). In general, clients' financing contracts are compatible with the national *shari'a* board of Indonesia standards.

[Insert Table 4 here]

c. Impact assessment with the standard difference-in-difference method for clients with equity financing and debt-based financing

In standard DD analysis (equation (1)), the treatment variable (M_{it}) is a binary variable indicating household membership as a client of an Islamic MFI (1 = yes, 0 = otherwise). Because the estimated model is a logarithmic function, whereas the dependent variable is natural logarithm of the clients' welfare indicator (income and expenditure), the coefficient (γ) of the treatment variable, when multiplied by 100, measures the approximate average percentage change in the indicator with respect to the treatment variable (Li et al., 2011b).

The results of the double standard DD show that rural household welfare measured by rural household annual income (RHA) and rural household annual expenditure (RHA) significantly improved for Islamic MFIs' clients. The improvement between 2012 and 2014 was for both financing types, clients with equity financing and clients with debt-based financing (see column 3, Tables 5 and 6). The average RHA for clients with equity financing rose 12.4% over 2 years; for clients with debt-based financing the increase was slightly less (12.1%); both increases are statistically significant at 1% level. A positive significant improvement is also evident in RHA for both types of client in the same period. To measure the true impact of financing by Islamic MFIs, the average outcome difference for non-clients between 2012 and 2014 (see column 6, Tables 5 and 6) is used to approximate the time trend suffered by clients with equity financing and debt-based financing.

After differencing the means of double standard DD between clients with equity financing and non-clients and clients with debt-based financing and non-clients, the average RHA for the clients with equity financing rose significantly by 3.2% as a direct impact of financing by Islamic MFIs, significant at 5% level (see column 7, Table 5). The average RHA for clients with debt-based financing rose significantly by 2.9%, which is also significant at 5% level (see column 7, Table 6).

Based on the double standard DD estimation (see column 7, Tables 5 and 6), the impact of financing by Islamic MFIs on all clients' annual income is positive and significant.

Clients who received equity financing exhibit a greater impact on income than clients with debt-based financing. These double standard DD estimations assume that only the treatment variables impact the rural households' outcomes (Y_{it}) between clients with equity financing, clients with debt-based financing, and non-clients. Considering the differences and the imbalance in the three groups' household characteristics and the possible association with Y_{it} , the double standard DD can lead to biased impact estimation. Therefore, it is important to estimate the DD equation with control variables.

[Insert Table 5 here]

[Insert Table 6 here]

d. Impact assessment with the adjusted difference-in-difference method for clients with equity financing and debt-based financing

To minimize any biased impact estimation, this study evaluates the welfare impact using the adjusted DD method with the fixed effect regression (equation (2)). Tables 7 and 8 present the adjusted DD results with the treatment variable (M_{it}) as a binary variable that indicate clients with equity financing and clients with debt-based financing.

Table 7 shows that clients with equity financing, on average, increased their annual income by 8.1% compared with non-clients. This is significant at the 5% level. Table 7 also show the result for the fixed effect robustness test, the result remains the same.

Table 8 presents the adjusted DD for clients with debt-based financing. The results show that clients with debt-based financing increased their annual income by 6.8% compared with non-clients; this is significant at the 5% level. The RHAЕ for clients with debt-based financing decreased by 4.9%, which is significant at the 10% level. However, when we use the fixed effect robustness test, the result remains the same for RHAІ (difference only in the standard error) but the RHAЕ result becomes insignificant. The control variable, major loss, is positive and significant on RHAЕ (at the 1% and 5% level) which implies "major loss" experienced by rural households will affect their expenditures (increase their expenditure by 9.7%) (see Table 8).

Overall, the explanatory power of the fixed effects model is adequate (see R^2 , Tables 7 and 8). In both tables, the F-statistics are significant at the 1% level; therefore, this strongly rejects the null hypothesis of the fixed effects model in minimizing the selection bias in impact estimation.

[Insert Table 7 here]

[Insert Table 8 here]

Based on the results of the adjusted DD estimates (see Tables 7 and 8), the impact of financing on RHA1 is better for both groups of clients compared with the standard DD estimation. In addition, clients with an equity financing contract experienced a greater increase in RHA1 than clients with a debt-based financing contract. Overall, the empirical findings from this research are consistent with the findings of Li et al. (2011b) and (Kondo et al., 2008) where MFI financing exhibit a positive impact on rural households' welfare, especially their income. The results are also similar to the findings of Adnan and Ajija (2015) and Rahman (2010b) that Islamic MFIs have a positive impact on rural households' welfare. Clients in this study received financing only within a year, therefore, the significant impact only affects income and not expenditure. The evaluation of the Islamic MFIs financing mechanisms is a major contribution by this study and the results show that equity financing gives a greater impact than debt-based financing in both the DD and adjusted DD estimates.

8. Conclusions

This study evaluates the impact of two types of financing by Islamic MFIs on rural households' welfare measured by income and expenditure. Using the double difference-in-difference estimation, the results confirm that equity financing with PLS is the ideal financing mode for Islamic MFIs' clients. The results show that clients with equity financing contracts improved their annual income more than clients with debt-based financing. In the standard DD estimation and adjusted DD estimation with fixed effect regression, the RHA1 for clients with equity financing is better than for clients with debt-based financing.

Our study also reveals that financing by Islamic MFIs has a positive, significant impact on rural households' welfare, especially improving their income. This shows the potential power of Islamic MFIs in Indonesia, particularly because Indonesia is the world's largest Muslim country. However, because most clients required collateral before receiving financing, this result implies that most clients are not very poor, which means that Islamic MFIs do not really target the poorest people in Indonesia. Moreover, this study results imply that financing from Islamic MFI can help to improve rural household annual income especially with the adoption of equity financing with PLS mechanism. The results also open an avenue for considering Islamic MFI as an alternative institution in providing financial access especially to poor Muslim worldwide.

With regard to *shari'a* compliance of clients' contracts, our study reveals that clients' financing contracts from Islamic MFIs parallel the standards of Indonesia's *shari'a* board. This result implies that most clients are satisfied with financing contracts from Islamic MFIs and that there are no *shari'a* compliance issues in their financing. A major limitation of this study is the study sample. Since the sample covers only three regencies in East Java province, Indonesia, it does not represent the whole of East Java or Indonesia. However, since no empirical study has evaluated the two financing mechanisms of Islamic MFIs, this study makes a unique contribution to Islamic finance literature.

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Table 1 Types of Microfinance

Type	Ownership	Fund Source	Example
Project Based	Private investors	Donors	Institutions are not formalized (development projects) e.g., Morocco and Russian microfinance development projects by The World Bank
Non-profit organization/ foundation	Private trustees	Grants, donations	The Sanduk in Comoros and Opportunity International in Australia
Cooperative	Members	Equity capital, deposits, commercial funds	FACECAM in Benin and KSP in Indonesia
Private company	Private capital, public capital	Equity capital, deposits, commercial funds	RDS Islami Bank Bangladesh Limited (IBBL) and Grameen Bank in Bangladesh
Public Entity	Central government, local government, company with public shareholders	Government, public	Cajas in Municipales Peru and Bank Rakyat Indonesia (BRI) in Indonesia

Sources: Lapenu and Pierret (2006); Gallardo (2001); Rahman and Ahmad (2010); Grameen Bank (2015); Opportunity International (2015); Mukherjee (1997); The World Bank (2013).

Table 2 Description of the Variables Used in Impact Analysis of Two Islamic MFI Financing Contracts

Variables	Type of variable	Description of variables
RHAI	Continuous	Log of rural household annual income
RHAE	Continuous	Log of rural household annual expenditure
ML	Dummy	Major loss indicator equal to "1" if yes and "0" otherwise
Year	Dummy	Year indicator equal to "1" for 2014 and "0" otherwise
Clients (equity financing)	Dummy	Clients with equity financing contract equal to "1" if yes and "0" otherwise
Clients (debt-based financing)	Dummy	Clients with debt-based financing contract equal to "1" if yes and "0" otherwise

Table 3 Characteristics of the Respondents

Characteristics of clients		Clients with equity financing (N = 112)		Clients with debt-based financing (N = 162)		All Clients (N = 274)		Non-Clients (N = 140)	
		Sub-total	% to N	Sub-total	% to N	Sub-total	% to N	Sub-total	% to N
Gender	Female	44	39.3%	55	34.0%	99	36.1%	80	57.1%
	Male	68	60.7%	107	66.0%	175	63.9%	60	42.9%
	Total		100.0%		100.0%		100.0%		100.0%
Age	18-25 years old	3	2.7%	7	4.3%	10	3.6%	15	10.7%
	26-35 years old	21	18.8%	28	17.3%	49	17.9%	51	36.4%
	36-45 years old	42	37.5%	61	37.7%	103	37.6%	32	22.9%
	46-55 years old	32	28.6%	47	29.0%	79	28.8%	17	12.1%
	56-65 years old	11	9.8%	15	9.3%	26	9.5%	20	14.3%
	Over 66 years old	3	2.7%	4	2.5%	7	2.6%	5	3.6%
Total		100.0%		100.0%		100.0%		100.0%	
Religion	Islam	112	100.0%	158	97.5%	270	98.5%	137	97.9%
	Protestant	0	0.0%	3	1.9%	3	1.1%	3	2.1%
	Roman Catholic	0	0.0%	1	0.6%	1	0.4%	0	0.0%
	Total		100.0%		100.0%		100.0%		100.0%
Education level	No education	4	3.6%	3	1.9%	7	2.6%	2	1.4%
	Primary school	22	19.6%	32	19.8%	54	19.7%	33	23.6%
	Middle school	29	25.9%	47	29.0%	76	27.7%	29	20.7%
	High school	46	41.1%	63	38.9%	109	39.8%	55	39.3%
	Three-year college	2	1.8%	5	3.1%	7	2.6%	7	5.0%
	Bachelor degree	9	8.0%	11	6.8%	20	7.3%	13	9.3%
	Postgraduate	0	0.0%	1	0.6%	1	0.3%	1	0.7%
	Other	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total		100.0%		100.0%		100.0%		100.0%	
Financing amount	< 1,000,000 rupiahs	6	5.5%	6	3.8%	12	4.5%	N/A	N/A
	1,000,001 – 3,000,000 rupiahs	28	25.7%	42	26.9%	70	26.4%		
	3,000,001 – 5,000,000 rupiahs	32	29.4%	35	22.4%	67	25.3%		
	5,000,001 – 7,000,000 rupiahs	18	16.5%	14	9.0%	32	12.0%		
	7,000,001 – 15,000,000 rupiahs	15	13.8%	26	16.7%	41	15.5%		
	> 15,000,000 rupiahs	10	9.2%	33	21.2%	43	16.3%		
	Total	109	100.0%	156	100.0%	265 ¹	100.0%		
	Collateral	No	1	0.9%	8	4.9%	9	3.3%	N/A
Yes		111	99.1%	154	95.1%	265	96.7%		
Total			100.0%		100.0%		100.0%		
Financing contract	<i>Murabahah</i>	N/A	N/A	143	88.2%	143	52.2%	N/A	N/A
	<i>Qard</i>	N/A	N/A	19	11.8%	19	6.9%		
	<i>Mudarabah</i>	112	100.0%	N/A	N/A	112	40.9%		
	Total		100.0%		100.0%		100.0%		
Major loss over	No	85	75.9%	117	72.2%	202	73.7%	N/A	N/A
	Yes	27	24.1%	45	27.8%	72	26.2%		
	Total		100.0%		100.0%		100.0%		

¹ Only 265 of clients answered this question.

Table 4 Degree of *Shari'a* Compliance of Islamic MFIs' Contracts

<i>Shari'a</i> compliance	Mean score
Debt-based financing	
<i>Murabahah</i> (cost plus mark up)	
1. Ownership of the goods or assets belongs to the Islamic MFI before the transaction (before goods sold to the clients)	4.93
2. Islamic MFIs always disclose the cost of goods and their margin before proceeding to a sale and purchase agreement	5.87
Debt-based financing	
<i>Qard</i> (benevolent loan)	
1. Islamic MFIs do not ask for any benefit from the loan	5.83
2. Islamic MFIs always consider rescheduling or write off of the loans if clients have difficulty in repaying the loang	6.16
Equity financing	
<i>Mudarabah</i> (profit-sharing)	
1. Islamic MFIs contribute 100% of the capital and clients contribute the effort	5.02
2. Losses are borne by the Islamic MFI as long as there is no fraud or negligence by the client	5.34

Table 5 Standard DD Estimates of Clients with Equity Financing

Outcome Variables	Clients equity financing (112)			Non-Clients (140)			DD impact estimator
	Year 2012	Year 2014	Difference (2014-2012)	Year 2012	Year 2014	Difference (2014-2012)	
			$D1 =$			$D2 =$	$DD =$
	$Y_{cef,12}$	$Y_{cef,14}$	$Y_{cef,14} - Y_{c1,12}$	$Y_{nc,12}$	$Y_{nc,14}$	$Y_{nc14} - Y_{nc12}$	$D1 - D2$
RHAI	7.428 (0.007)	7.553 (0.024)	0.124*** (0.007)	7.343 (0.028)	7.435 (0.027)	0.092*** (0.012)	0.032** (0.015)
RHAE	7.198 (0.022)	7.304 (0.023)	0.106*** (0.008)	7.090 (0.026)	7.206 (0.023)	0.116*** (0.011)	-0.010 (0.014)

Note: Entries represent means of log household annual income and log household annual expenditure for the client group and non-client group, respectively; numbers in parentheses are standard errors.
 ** and *** represents 5% and 1% significance level, respectively.

Table 6 Standard DD Estimates of Clients with Debt-Based Financing

Outcome Variables	Clients debt-based financing (162)			Non-Clients (140)			DD impact estimator
	Year	Year	Difference	Year	Year	Difference	
	2012	2014	(2014-2012)	2012	2014	(2014-2012)	
	$Y_{cdbl,12}$	$Y_{cdbl,14}$	$D1 = Y_{cdbl,14} - Y_{c1,12}$	$Y_{nc,12}$	$Y_{nc,14}$	$D2 = Y_{nc14} - Y_{nc12}$	$DD = D1 - D2$
RHAI	7.437 (0.024)	7.559 (0.025)	0.121*** (0.006)	7.343 (0.028)	7.435 (0.027)	0.092*** (0.012)	0.029** (0.013)
RHAE	7.236 (0.021)	7.336 (0.021)	0.100*** (0.005)	7.090 (0.026)	7.206 (0.023)	0.116*** (0.011)	-0.015 (0.012)

Note: Entries represent means of log household annual income and log household annual expenditure for the client group and non-client group, respectively; numbers in parentheses are standard errors.

** and *** represents 5% and 1% significance level, respectively.

Table 7 Adjusted DD Estimates for Clients with Equity Financing

Variable	Dependent Variable			
	RHAI	Robust RHAI	RHAE	Robust RHAE
Intercept	16.995*** (0.012)	16.995*** (0.008)	16.437*** (0.012)	16.437*** (0.008)
Year dummy ($d_{2,t}$)	0.221*** (0.024)	0.221*** (0.027)	0.259*** (0.023)	0.259*** (0.024)
Control Variables (X_{it})				
Major Loss dummy (ML)	-0.063 (0.045)	-0.063 (0.055)	0.062 (0.044)	0.062 (0.057)
Treatment Variables (M_{it})				
Clients PLS	0.081** (0.035)	0.081** (0.035)	-0.029 (0.034)	-0.029 (0.034)
F Statistic	66.36***	112.04***	77.15***	91.70***
Household Fixed Effect	Jointly significant	Jointly significant	Jointly significant	Jointly significant
R-squared	0.444	0.444	0.481	0.481
Total Observation	504	504	504	504

Note: Numbers in parentheses are standard errors.

, * represent the 5%, 1% significance levels for the t -test.

Table 8 Adjusted DD Estimates for Clients with Debt-Based Financing

Variable	Dependent Variable			
	RHAI	Robust RHAI	RHAE	Robust RHAE
Intercept	17.025*** (0.010)	17.025*** (0.007)	16.506*** (0.009)	16.506*** (0.006)
Year dummy ($d_{2,t}$)	0.212*** (0.023)	0.212*** (0.027)	0.254*** (0.020)	0.254*** (0.024)
Control Variables (X_{it})				
Major Loss dummy (ML)	-0.006 (0.038)	-0.006 (0.044)	0.097*** (0.034)	0.097* (0.042)
Treatment Variables (M_{it})				
Clients non-PLS	0.068** (0.031)	0.068** (0.034)	-0.049* (0.028)	-0.049 (0.031)
F Statistic	87.55***	139.06***	110.76***	155.67***
Household Fixed Effect	Jointly significant	Jointly significant	Jointly significant	Jointly significant
R-squared	0.467	0.467	0.526	0.526
Total Observation	604	604	604	604

Note: Numbers in parentheses are standard errors.

*, **, *** represent the 10%, 5%, 1% significance levels for the t -test.