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ASSESSING THE VIABILITY OF MUZA'RAH AGRO FINANCING AS A SUSTAINABLE SOLUTION FOR SMALL-SCALE FARMERS: A CASE STUDY FROM PAKISTAN

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ABSTRACT

The interplay between the Muza'rah (Sharecropper) agro-financing structure and its impact on rural income and rural poverty alleviation constitutes a multifaceted phenomenon. In this study, we seek to understand of the relation between Muza'rah agro-financing structure and rural income and the mediating role of national agricultural output for the case of Pakistan, a predominantly Muslim country characterized by a well-established Islamic banking and finance infrastructure. Using data from the Pakistan Social and Living Standard Survey (PSLM), the research reveals that the rural per capita income is significantly and negatively related to the Muza'rah agro-financing structure, which is further strengthened by the level of the national agricultural output. The finding underscores the importance of nuanced understanding for policymakers and practitioners engaged in poverty alleviation efforts, emphasizing the need to consider contextual variables and a nation's developmental status when designing interventions to improve rural livelihoods.

Keywords: Muza'rah agro financing, Rural poverty, National agriculture output.
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I. INTRODUCTION

Poverty is a multifaceted and complex issue that has global implications. Developing nations are grappling with this challenge, and Pakistan is no exception. Over the past two decades, Pakistan made a stride in reducing poverty rates from 61.6 percent in 1998-99 to 21.5 percent in 2018-19. Notably, poverty rates decreased from 47.4 percent to 10.7 percent in urban areas and from 67.5 percent to 27.6 percent in rural regions during this period (PBS, 2020). Despite this progress, there is a need for more consistent and sustained efforts to reduce poverty rates. In Pakistan, poverty is a transitory phenomenon, and individuals frequently move in and out of poverty (Farooq & Ahmad, 2020). From 2001 to 2015, estimates show that urban poverty rates declined faster than rural poverty rates, which were twice as severe in 2015. Given that a large proportion of Pakistan's population lives in rural regions, where agriculture is the primary occupation, it is crucial to address rural poverty as a priority.

Pakistan's economy largely depends on agriculture, with almost 64 percent of the population residing in rural areas and deriving their livelihood directly or indirectly from agricultural activities such as crop production, animal husbandry, and agricultural labor. Therefore, the growth of the agricultural sector is closely associated with the nation's development (PBS, 2020). However, people in developing nations who rely on agriculture are often poorer than those working in other economic sectors (FAO, 2014; Diao et al., 2010). Nobel laureate Schultz highlighted the importance of understanding the economics of poverty, particularly in agriculture, as it employs most of the world's poor (Cervantes-Godoy, & Dewbre, 2010). Given the prominence of agriculture in Pakistan's rural community, the inconsistent trend in rural poverty signifies the struggles faced by the agricultural sector in the country.

Several empirical and policy papers have pointed out the challenges small-scale farmers face in Pakistan. These include government intervention in price administration, limited research and development, lack of financing options, small landholdings, and a shortage of female extensionists (Baloch & Thapa, 2018; Khan et al., 2022; Amjad, 2010; Javed et al., 2023). Additionally, soil and water erosion, inadequate infrastructure, poor market facilities, unforeseen weather patterns, and pest attacks pose significant threats to the farming community in Pakistan (Ahmad et al., 2020; Rehman et al., 2017). Lack of access to conventional finance and limited cultivable land is frequently cited as the most pressing obstacle for farmers to achieve sustainable growth (Baloch & Thapa, 2018; Khan et al., 2021; Amjad, 2010; Javed et al., 2023). Due to these reasons, small farmers in rural areas have a lower average yield for main crops such as wheat, rice, maize, cotton, and sugarcane, compared to large-scale farming units in urban areas with more extensive farming lands and more structured financing systems.

Agricultural economists have sought to examine the causal impact of a flourishing agricultural sector on poverty alleviation. In addition, they have highlighted the significance of alternative financing structures to support small-scale farmers in overcoming constraints in running their operations and ensuring sustainable income. Some notable studies in this field include Irz et al. (2001), who conduct a cross-country estimation of the links between agricultural yield per unit area and poverty measures; Jatuporn et al. (2011), who empirically investigate

the impact of agricultural output on economic growth in Thailand; Awokuse & Xie (2014), who examine the role of agriculture in encouraging economic development in nine developing countries; Corral et al. (2017), who examine the part played by agricultural policies in reducing poverty in rural communities of Pakistan; Rehman et al. (2017), who conduct a critical review of the literature to determine the significant role of agricultural development in reducing poverty; Susilastuti (2018), who analyzes the impact of factors affecting agricultural production and their implications for gross regional product (GRP) growth and poverty alleviation; Runganga & Mhaka (2023), who seek to ascertain the impact of agriculture production on economic growth in Zimbabwe; Bangash (2020), who critically examines the Muza'rah as a prominent Islamic structure for small-scale farmers in developing countries; Yulianti, Cahyati, and Anjellah (2020), who examine the effect of the Muza'rah financing structure on rice field management in Indonesia; Yahuza (2018), who assesses the viability of the Muza'rah contract on agro-financing in rural poverty reduction in Kano, Nigeria; and Majid (2021), who proposed an integrated financing structure based on the Muza'rah contract for the agriculture sector.

In Pakistan, small-scale farmers face formidable challenges including limited access to finance and cultivable land in rural areas, hindering agricultural productivity and perpetuating poverty. This study aims to elucidate the causal relationship between the Muza'rah agro-financing structure and poverty alleviation by examining its effect on individual income within Pakistan's rural communities. Distinguished from previous research, this investigation employs the sharecropping model as a surrogate indicator of Muza'rah financing. Moreover, it distinguishes itself through a rigorous quantitative analysis of Muza'rah financing's impact on key macroeconomic variables, leveraging a substantial sample size. By addressing these gaps in existing literature, this research endeavors to provide valuable insights into the potential of Muza'rah financing as a catalyst for poverty reduction and economic development in rural Pakistan.

This study offers valuable insights into the potential of alternative Islamic agro-financing structures to reduce poverty by increasing the individual income of rural farmers in Pakistan. Using census data from three cohorts of the Pakistan Standard and Living Measurement Survey conducted by the Pakistan Bureau of Statistics, this study examines the role of the Muza'rah agro-financing structure in reducing poverty and increasing individual income among the rural population of Pakistan. This study unveils a noteworthy finding: the per capita income within rural populations is less for farmers with the Muza'rah agro-financing structure, all else equal. This phenomenon persists despite accounting for potential mediation of the national agricultural output. The findings of this research have significant implications for policymakers in Pakistan, highlighting the urgent need for structural reforms to improve the well-being of rural farmers. Moreover, this study can guide future research as scholars explore the use of different Shari'ah financing structures, such as Musāqāh and Salam, to support small-scale farmers across underdeveloped and developing nations. Ultimately, these efforts may lead to the growth and prevalence of alternative agro-financing structures, improving farmers' livelihoods worldwide.

We structure this paper as follows. Section 2 evaluates different theoretical models and empirical literature that advocates the role of Muza'rah agro-financing in mitigating rural poverty through increasing agricultural output. Section 3 discusses data, empirical models, and estimation strategy. Section 4 encapsulates the statistical results and discusses the findings. Section 5 provides concluding observations.

II. LITERATURE REVIEW

Poverty is widespread in the rural areas of Pakistan, where individuals lack access to income, clothing, shelter, healthcare, education, sanitation, and human rights. In Pakistan, poverty is typically higher in rural regions than in urban areas (Chaudhry et al., 2006). In the 1990s, poverty in rural regions increased more rapidly, and the incidence of rural poverty (36.3 percent) was considerably higher than that of urban poverty in FY1999 (22.6 percent) (Saleem et al., 2023). Agriculture is the primary activity in rural life, and more than 40% of the rural workforce depends entirely on farm-related enterprises. However, several factors have contributed to the decline in the agricultural sector of Pakistan, including water scarcity and irrigation issues, land degradation, limited access to credit and financial services, lack of modern technology and infrastructure, climate change and natural disasters, and policy and governance issues (Susilastuti, 2018; Perveen et al., 2020; Ahmad et al., 2014; Runganga & Mhaka, 2023).

Limited access to traditional financing and small landholding are the most significant factors that hinder the development of small-scale farmers in Pakistan and ultimately exacerbate the poverty trend in rural areas (Javed et al., 2023; Ullah et al., 2020; Chandio et al., 2018). In Pakistan's rural areas, many farmers depend on loans, with local shopkeepers and relatives being the primary lending sources. However, the outstanding agriculture advances account for only 6% of total bank advances, and the current flow of credit fulfills just 40% of the agriculture credit demand of the farming community. Only 2 million of the 6.6 million farmers have access to legal financing, while the rest must rely on informal sources at exorbitant rates ranging from 40% to 50% per annum. Because 70% of agriculture loan regulations were not completed, informal agricultural lending providers charged extraordinarily high-interest rates to poor farmers in every region of Pakistan (Saqib et al., 2018).

Furthermore, Khandker & Faruqee (2003) research reveals a growing disparity in access to formal credit between the richest and poorest sections of the rural population. In 1985, the poorest families received only 1% of formal credit, while the wealthiest households received 60%. In 1996, the difference widened, with the poorest families receiving only 2% of formal credit, while the wealthiest households received 72%. Despite well-targeted subsidized government initiatives, small farmers and impoverished households needed assistance to obtain loans from institutional sources. Small and tenant farmers obtain most of their financing from non-institutional sources. The government's subsidized loan initiatives have been ineffective, leading to an increase in the dominance of large farmers. The main characteristics of formal credit are low recovery rates and high default rates,

compounded by the low weighted rate of return each year on subsidized loans (Ojiako et al., 2014; Saqib et al., 2016).

Moreover, research suggests that a significant proportion of small-scale farmers in Pakistan, approximately 30%, requires additional cultivable land. The country's inadequate landholding of small-scale farmers is a well-established issue, with few wealthy feudal lords possessing the majority of productive lands. Scholars argue that poverty in Pakistan is not merely a result of resource constraints but rather a consequence of a power nexus that restricts the poor's access to income and prospects for economic advancement (Baloch & Thapa, 2018; Amjad, 2010; Shahbaz, Ali, Khan, Ahmad, 2010). This power structure, consisting of government institutions and influential local elites, creates barriers for the poor to access productive assets, financial resources, public services, and governance opportunities, thereby making it exceedingly difficult for them to escape poverty (Amjad, 2010; Ahmad et al., 2020; Banerjee & Duflo, 2008). To address this issue, providing land access to landless labor and tenant households, along with crucial inputs such as loans, seeds, fertilizer, water extension services, and market access, is essential. In Pakistan, transferring the estimated 2.6 million acres of state land to the landless and providing financing to tenant farmers to purchase land could significantly improve the situation of landless and tenant farmers (Amjad, 2010; Brohi, 2010). However, access to financing for small-scale farmers is a persistent challenge, given the risk associated with agriculture, incompatible sources of financing, and the marginalization of the sector in the banking industry. Therefore, measures to develop financing products and services that cater to the specific needs of small-scale farmers are crucial for their growth and sustainability (Perveen et al., 2020; Rehman et al., 2017). While subsidies and welfare programs can serve as temporary alternatives to financing equipment, machinery, and human capital, a more enduring and long-lasting financing alternative is required to support small and micro-farming structures with low-cost and convenient financing (Bashir & Azeem, 2008).

Muza'rah, a crop-sharing partnership, is a well-established financing contract historically supporting small-scale farming in Muslim-dominated regions. Although the Holy Book, Quran, and the authentic sayings of the last Messenger, Muhammad ﷺ, do not expressly address the concept of Muza'rah, most Islamic legal scholars have linked an occurrence during the Prophet Muhammad's ﷺ lifetime to this type of partnership. In this instance, the Prophet Muhammad ﷺ provided the residents of Khyber with land to cultivate, and in return, they were permitted to keep half of the produced fruits (Bangash, 2020). Sayyid Sabiq defines Muza'rah as a contract encompassing agricultural output, specifying an output split of the half, a quarter, or another agreed-upon amount between the landowner and the farmers (Sabiq, 2008). In contrast, Imam Syafi'i maintains that under Muza'rah, farmers work on the land and receive a share of the product as compensation, while the landlord contributes seeds (Ercanbrack, 2019). Sheikh Muhammad Yusuf Qordhawi notes that landowners provide farmers with equipment, seeds, and working animals and stipulate the output split, such as 12, 13, or another agreed-upon amount, in the Muza'rah contract (Qadhawi, 1993).

Through the Muza'rah scheme, Islamic finance holds significant potential as a solution to the issue of restricted agricultural land by utilizing the idle agricultural

property that owners do not wish to operate on (Majid, 2021; Larasati et al., 2017). When Islamic microfinance institutions, such as BMT, provide financing to impoverished farmers who would otherwise not be facilitated by banks, this potential can be realized and turned into an advantage. Moreover, Muza'rah helps farmers finance production expenses through a collateral-free plan (Bangash, 2020). According to Moh'd, Omar, & Saiti (2017), Muza'rah has played a crucial role in financing the agricultural sector within the modern banking system. Since 1983, Islamic banks in Sudan have adopted Muza'rah, utilizing a profit-and-loss sharing plan in which farmers receive 75% of the profits and banks receive the remaining 25%. The practical implementation of Muza'rah in Sudan demonstrates that it can be utilized in modern banking and benefit small-scale farmers (Moh'd et al., 2017).

A few studies have examined the efficacy and efficiency of traditional Islamic financing contracts in facilitating agricultural growth in developing countries. These include, as examples Bashir & Azeem (2008) and Hassan et al. (2012). The former, titled "The Role of Islamic Banking in Agricultural Development in Bahawalpur, Pakistan," employs standard deviation, variance, and Chi-square testing to argue that Muza'rah should be utilized as a solution to the credit constraints faced by farmers in the region among the range of Islamic banking products. The latter suggests that Shari'ah-compliant Muza'rah represents an appropriate alternative to exploitation-based and riba-associated land tenancy between landlords and tenants.

Shafiai (2011) focuses on Egypt in implementing Muza'rah and Musāqāh theories in the Tanta agricultural sector. The study examines the perspectives of modern scholars and practitioners at Azhar and Cairo universities, the Faisal Bank Library, and the Saleh Kamel Islamic Economics Research Centre. The findings indicate that Muza'rah and Musāqāh are effective mechanisms for agricultural investment as they benefit both parties and play a significant role in the reactivation of idle land by assisting in cultivating more land. Similarly, Ascarya (2009) discover that the profit and loss sharing (PLS) practice in Indonesia is based on partnership as a work foundation, the primacy of equity capital, and equality, prosperity, mutual collaboration, and Ta'awun (mutual assistance) through one-third and one-half share models. Overall, this technique has proven highly effective and helpful to the government, the commercial sector, and individuals, mainly rural farmers.

In Sudan, the Sudanese Islamic Bank (SIB) has adopted Muza'rah financing partnerships in three distinct agricultural trends, canal irrigation, pump irrigation, and rain-fed, offering capital assets and inputs. At the same time, the farmer provides his land, labor, and management. The farmer receives 30 percent of the net earnings for management, and the remaining profit is shared between the bank and the farmer based on their equity stake (Al-Harran, 1990). Furthermore, Rahman and Othman (2012) conduct research for the case of Selangor State, Malaysia. They find that the people of Malaysia who practice Muza'rah sharecropping and pay zakat tax follow Shafi'i Mazhab beliefs and embrace Hanafi beliefs by sharing seeds, fertilizers, pesticides, transportation, and labor costs. They rent land for RM100 to RM900 per acre, and farmers receive a 1/2 or 2/3 percent sharecropping.

Another example is Yaacob's (2013) study of the Muza'rah paradigm between the Malaysian government and the Orang Asli people. The study shows that the

Muza'rah model benefits both the government and the aborigines, and the model implants a humanistic sensibility in Malaysian government policy. It also suggests that aside from remuneration, the abilities of the Orang Asli people must be taught for long-term survival. The model implies that the government is a caring institution, hence avoiding all damaging accusations regarding the treatment of Orang Asli.

The literature review provides an overview of the poverty situation in rural areas of Pakistan and the challenges faced by small-scale farmers in accessing formal financing, which further exacerbates the poverty trend. The study's objective is to explore the potential of Muza'rah, an Islamic crop-sharing partnership, as a financing alternative to support small-scale farmers. The literature review highlights the various factors contributing to poverty in rural Pakistan, including limited access to traditional financing, inadequate landholding, and the power nexus that restricts the poor's access to income and prospects for economic advancement. The review suggests that small-scale farmers' access to appropriate financing products and services is essential for their growth and sustainability which eventually reduce rural poverty in Pakistan.

Table 1.
Overview of the Empirical Literature on the Topic

Sr. No	Author (s)	Methodology			Measures	Findings	Control Variables
		Sample Size	Sample Period	Country			
1	Susilastuti (2018)	6 Provinces	2007 - 2016	Indonesia	Agricultural Production Gross Regional Production Poverty	Agricultural Production has no significant effect on Gross Regional Production Rate. Gross Regional Production Growth Rate has a significant impact on poverty reduction.	Inflation Wetland Area. Productivity of Agricultural Land of Paddy Farmers' Term of Trade
2	Corral et al. (2017).	66 Interviews	2006 - 2013	Cape Verde	Agricultural Policies Poverty Reduction	The study found agricultural policies to encourage agricultural output and eventually reduce poverty.	Living Conditions Infrastructures Access and Availability of Water Diversity of Production Organization and Participation of Communities in Projects
3	Rehman et al. (2017)	Macro Data – China	1990 - 2015	Developing Countries - China	Agricultural Growth Poverty Reduction	The growth of agriculture plays a significant role in mitigating poverty.	-
4	Kadir and Rizki (2016)	161 Observations	2002 - 2008	Indonesia	Non – Agricultural GDP Agricultural Land Area Education Level Rural Poverty Area Non-Rural/Rural Agricultural GDP Non – Rural/Rural Agriculture Wage	The agricultural sector is still the driving force of economic growth and is critical to poverty alleviation in rural areas.	-

Table 1.
Overview of the Empirical Literature on the Topic (Continued)

Sr. No	Author (s)	Methodology			Measures	Findings	Control Variables
		Sample Size	Sample Period	Country			
5	Yulianti et al. (2020)	11 Landowners 11 Farmers	2020	Indonesia	Muza'rah Structure Trust Factor Unemployment Poverty	Religious denomination correlates with earned income among women. No correlation is found amongst men.	-
6	Hassan et al. (2012)	120 Respondents	2012	Pakistan	Terms of Financing (Ijarah, Diminishing Musharakah, and Murabaha) Need of Working Capital (Salam, Muza'rah, Murabaha, and Musawamah). Asset Ownership Crop Yield Farmer's Income	There is a significant relationship between Islamic Banking Products and Agricultural Development. Islamic Banking Products increase the Asset Ownership, Yield, and Income for Farmers.	Technological Change Irrigation System Effective Use of Finance. Problem of Collateral Credit Standing
7	Rahman and Othman (2012)	403 Paddy Farmers and Tithe Payers as Respondents.	13th – 19th October 2003	Malaysia	Islamic Financing Structures (Ijarah – Muza'rah) Paddy Farmers' Development.	The Paddy Farmers in Malaysia use Ijarah and Muza'rah structures for financing their agricultural ventures.	-
8	Yahuza (2018)	152 out of 250 Farmers.	2018	Nigeria	Muza'rah Structure Agro – Financing Poverty Alleviation	The research found Muza'rah a significant structure for agro–financing.	Land Tenure System Scarcity of Inputs Lack of Party to Share the Land Self-Food Secured

III. EMPIRICAL METHODOLOGY AND DATA

This section specifies the empirical model, explains the estimation strategy, and discusses the data.

3.1. Data

The study's data are from the Pakistan Social and Living Standard Survey (PSLM) conducted by the Pakistan Bureau of Statistics (PBS). The data are from three separate periods: 2010-2011, 2014-2015, and 2019-2020 with a sample size of 76,546, 78,635, and 195,000 households, respectively. Spanning three distinct periods, this study strategically selects its sample cohorts to capture temporal variations in socio-economic conditions, agricultural practices, and policy landscapes. Furthermore, the substantial sample size associated with each cohort not only enhances the statistical power and reliability of analyses but also enables robust assessments of Muza'rah financing's impact. By leveraging data consistency and continuity across survey iterations, the study ensures methodological coherence while minimizing potential biases, thereby strengthening the validity of its findings.

The surveys provide extensive information about various demographic characteristics, including gender, age, ethnicity, education, income, and regional distributions. The data gathering procedure employs tablet-based android software with GIS for monitoring, which the data processing center built to verify the data's dependability and quality (PBS, 2020). This census also pools data for our focus independent variable Muza'rah financing, proxied by sharecropper agro structure in reply to the survey question Sec E Q6 "What was the employment status" with the following response options: employer, self-employed, paid employee, owner cultivator, sharecropper, contract cultivator, and livestock.

This study investigates a sample of 772,518 research subjects from the entire census population included in the PSLM surveys. However, due to applicable exclusions, the analysis is limited to a sample of respondents. To exclude juveniles who are legally prohibited from working under the Islamic Republic of Pakistan's constitution, an age floor of 14 years is set. This exclusion criterion aligns with prior research conducted by Campos et al. (2016) in China. Following this restriction, the sample is reduced to 523,211 respondents. Furthermore, The Heckman two-step model is employed to address the sample selection bias issue, and a subsample of 108,474 respondents is selected for analysis. A result table of the Heckman two-step model will be available upon request.

The Heckman two-step model has been widely utilized in previous studies on wage gaps, such as those conducted by Ma (2022) in China. The Heckman two-step model is a valuable method to consider for examining the impact of sharecropping agro structure on alleviating rural poverty, as it can help to correct potential sample selection bias in the data. For instance, if the data only includes households currently engaged in agriculture and have access to land, this could introduce sample selection bias into the analysis. This is because households that do not have access to land or are not currently engaged in agriculture may have different poverty levels than those that do. The Heckman Two-Step Model can help to correct for this potential bias by estimating a selection equation that models the probability of households being engaged in agriculture and having access to land

and then using the inverse Mills ratio (IMR) as a control variable in the outcome equation that models the relationship between sharecropping agro structure and poverty alleviation.

This final sample represents 14.04% of the total population and is sufficient for empirically analyzing the phenomenon of interest in scholarly circles when studying a census population.

3.2. Descriptive Statistics

Table 2 provides summary statistics of the variables used in the analysis. It reveals that the average age of the sample is 27 years old. The gender distribution in the sample shows that 46% of respondents are female. Among the sample, 74.08% comprise individuals from minority ethnic groups, such as Pashtun, Sindhi, Muhajir, Baluchi, Kashmiri, and Saraiki. The study's sample is drawn from three different cohorts. Specifically, 56.8% of respondents are from cohort I (2019 - 2020), 13.1% from cohort II (2014 - 2015), and 30.01% from cohort III (2010 – 2011). Regarding geographic distribution, the sample comprises individuals from four provinces in Pakistan. Khyber Pakhtunkhwa accounts for 13% of the sample, followed by Punjab province (44.1%), Sindh (18%), and Baluchistan (24.9%), which is the least populated province in Pakistan. Note that roughly 5% of the sample state the sharecropping agro structure on the employment canvas in rural areas of Pakistan. Finally, the average monthly per capita income observed for the studied cohorts is 18,721.24 PKR (equivalent to 117.52 USD as of the end of 2020).

Table 2.
Summary Statistics for Demographic and Focus Variables

	Observations	Mean
AGE	523,211	26.847
GENDER	523,211	.461
ETHNICITY	523,211	.252
EDUCATION	523,211	.302
TDI	523,211	.568
TDII	523,211	.131
PDI	523,211	.130
PDII	523,211	.441
PDIII	523,211	.180
SHARECROPPER	523,211	.05
INCOME	523,211	18721.24

NOTE: AGE represents the average age of the research subjects. GENDER is a binary variable that takes the value of 1 if the respondent is female and 0 otherwise. ETHNICITY is a binary variable that captures the ethnicity of the research subjects, where 0 is for individuals from ethnic minority factions and 1 for those from the majority group. EDUCATION encapsulates the educational status of research subjects, where 1 is assigned to individuals who have attained formal education. In contrast, 0 was assigned to individuals with no formal educational background. TDI takes the value of 1 for respondents from the first studied cohort (2019-2020) and 0 otherwise, while TDII takes the value of 1 for respondents from the second studied cohort (2014-2015) and 0 for the remaining two cohorts. PDI is 1 for residents of Khyber Pakhtunkhwa province and 0 otherwise, while PDII is 1 for residents of Punjab province and 0 for vice versa. PDIII takes the value of 1 for residents of Sindh province and 0 for the remaining three studied provinces. Finally, SHARECROPPER is a binary variable that identifies individuals affiliated with a sharecropper agro structure, with 1 denoting such affiliation and 0 otherwise. INCOME represents the average monthly income of the studied research subjects.

3.3. Empirical Model

To achieve the aims of this study, two distinct equations are developed: a baseline equation and an extended equation. These equations are outlined below:

$$LNINCO = \alpha 0 + \alpha 1 LAGE + \alpha 2 GENDER + \alpha 3 ETHNICITY + \alpha 5 EDUCATION + \alpha 6 TDI + \alpha 7 TDII + \alpha 8 PDI + \alpha 9 PDII + \alpha 10 PDIII + \alpha 11 SHARECROPPER + \varepsilon \quad (\textit{Baseline Equation } 1)$$

$$LNINCO = \alpha 0 + \alpha 1 LAGE + \alpha 2 GENDER + \alpha 3 ETHNICITY + \alpha 5 EDUCATION + \alpha 6 TDI + \alpha 7 TDII + \alpha 8 PDI + \alpha 9 PDII + \alpha 10 PDIII + \alpha 11 SHARECROPPER + \alpha 12 \text{SHCRxAGOU} + \varepsilon \quad (\textit{Extended Equation } 2)$$

This study incorporates various independent variables to analyze their impact on the dependent variable, monthly per capita income. The model includes the natural logarithm of monthly per capita income, represented as LNINCO, and the natural logarithm of the age of the research subjects denoted as LAGE. Additionally, gender is included as a binary variable where 1 represents female and 0 otherwise. Moreover, the study also considers the ethnic minority status, represented as ETHNICITY, where 0 is assigned to ethnic minority, whereas 1 is assigned to residents of the Punjabi ethnic group, which represents the majority

in Pakistan. Similarly, the variable EDUCATION represents the educational status of research subjects, where 1 is assigned to individuals who have attained formal education. In contrast, 0 is assigned to individuals with no formal educational background. SHARECROPPER represents individuals with the sharecropping agro structure in the rural regions of Pakistan, where 1 denotes the sharecropper individuals, while 0 represents the other strata of professions amongst the rural community. Dummy variables are also incorporated in the model to control for cohort effects, where TDI labels 1 as the first-time dummy variable representing the last studied cohort (2019 – 2020) and 0 otherwise. TDII tags 1 as the second time dummy variable reflecting the second last studied cohort (2014 – 2015), whereas 0 is assigned to the other time cohorts. Additionally, regional dummies are included, where PDI denotes 1 as the residents of the Khyber Pakhtunkhwa province and 0 otherwise, PDII indicates 1 for the residents of the Punjab province and 0 for vice versa, and PDIII specifies 1 as the residents of the Sindh province and 0 for the remaining three studied provinces. Lastly, ε denotes the random error term, assumed to be typically and independently distributed. Moreover, equation (ii) expands the baseline equation (i) with SHCRxAGOU, this represents the interaction of sharecropper agro structure and national agricultural growth.

We do not encounter multicollinearity in the data used for this research. We have attached the correlation table in appendix to provide a comprehensive understanding of the correlation among the predictor variables.

This study investigates whether the variable of interest SHARECROPPER (Muza'rah agro financing structure) can shape rural poverty and also introduces agricultural output as a moderating variable. Some studies have examined this in different contexts. Majid (2021) and Larasati et al. (2017) propose that the Muza'rah financing structure in Islamic finance presents a promising policy solution to address the issue of limited agricultural land accessible to small-scale farmers. The approach advocates for forming a joint venture between owners of idle agricultural land willing to cultivate and small-scale micro farmers. Such an initiative would enable small-scale farmers to access more extensive agricultural land, which they could not afford on their own, and also provide an opportunity for idle landowners to make productive use of their land.

Furthermore, Bangash (2020) denotes that Muza'rah agro financing assists small–scale farmers in financing their production expenses by offering a collateral–free financing structure. Subsequently, Moh'd et al. (2017) assert that Muza'rah has been instrumental in financing the agricultural sector within the modern banking system. In Sudan, Islamic banks have adopted Muza'rah since 1983, employing a profit-and-loss sharing plan in which farmers receive 75% of the profits while banks receive the remaining 25%. The practical implementation of Muza'rah in Sudan showcases its potential to be utilized in modern banking and benefit small-scale farmers. Similarly, in a study conducted by Shafiai (2011) in Egypt, the implementation of Muza'rah and Musāqāh theories in the Tanta agricultural sector is examined. The findings reveal that Muza'rah and Musāqāh are effective mechanisms for agricultural investment as they benefit both parties involved and play a significant role in reactivating idle land and cultivating more land. Likewise, Ascarya (2009) find that in Indonesia, the profit and loss sharing (PLS) practice is based on partnership as a work foundation, the primacy of equity

capital, and equality, prosperity, mutual collaboration, and Ta'awun (mutual assistance) through one-third and one-half share models. The distinctive element of the present study is to examine the impact of the Muza'rah agro-financing structure on rural poverty using census microdata for a large sample size of 108,474 respondents. Hence, this paper sheds light on this significant issue with more detail and more robust evidence.

IV. RESULTS AND ANALYSIS

Tables 3 and 4 present the findings of the baseline and extended equation models, respectively. The study employs simple pooled OLS regression in combination with the Heckman two-step model to account for sample selection bias, which typically arises due to variations in the size of the observations under investigation.

Table 3.
Pooled OLS Regression Results with Heckman Two Step Model – Baseline Equation

LNINCO	Coefficient	P>|t|
LAGE	.014	0.226
GENDER	-.057	0.000
ETHNICITY	-.106	0.000
EDUCATION	.022	0.018
SHARECROPPER	-.045	0.000
TD1	.528	0.000
TDII	-1.308	0.000
PDI	-.904	0.000
PDII	-.543	0.000
PDIII	-.466	0.000
Constant	1.388	0.000
Observations	108,474	
R^2	0.462	

NOTE: *LNINCO* denotes the natural logarithm of the average monthly income of the studied research respondents. *LAGE* represents the natural logarithm of the average age of the research subjects. *GENDER* is a binary variable that takes 1 if the respondent is female and 0 otherwise. *ETHNICITY* is a binary variable that captures the ethnicity of the research subjects, where 0 is for individuals from ethnic majority factions and 1 for those from the minority group. *EDUCATION* encapsulates the educational status of research subjects, where 1 is assigned to individuals who have attained formal education. In contrast, 0 was given to individuals with no formal educational background. *TDI* takes 1 for respondents from the first studied cohort (2019-2020) and 0 otherwise, while *TDII* takes 1 for respondents from the second studied cohort (2014-2015) and 0 for the remaining two cohorts. *PDI* is 1 for residents of Khyber Pakhtunkhwa province and 0 otherwise, while *PDII* is 1 for residents of Punjab province and 0 for vice versa. *PDIII* takes the value of 1 for residents of Sindh province and 0 for the remaining three studied provinces. Finally, *SHARECROPPER* is a binary variable identifying individuals affiliated with a sharecropper agro structure, with 1 denoting such affiliation and 0 otherwise.

Table 4.
Pooled OLS Regression Results with Heckman Two Step Model – Extended Equation

LNINCO	Coefficient	P>|t|
LAGE	.013	0.255
GENDER	-.057	0.000
ETHNICITY	-.102	0.000
EDUCATION	.022	0.017
SHARECROPPER	-.060	0.000
SHCRxAGOU	-.129	0.000
TD1	.543	0.000
TDII	-1.292	0.000
PDI	-.905	0.000
PDII	-.545	0.000
PDIII	-.467	0.000
Constant	1.375	0.000
Observations	108,474	
R^2	0.466	

NOTE: *LNINCO* denotes the natural logarithm of the average monthly income of the studied research respondents. *LAGE* represents the natural logarithm of the average age of the research subjects. *GENDER* is a binary variable that takes 1 if the respondent is female and 0 otherwise. *ETHNICITY* is a binary variable that captures the ethnicity of the research subjects, where 0 is for individuals from ethnic majority factions and 1 for those from the minority group. *EDUCATION* encapsulates the educational status of research subjects, where 1 is assigned to individuals who have attained formal education. In contrast, 0 was assigned to individuals with no formal educational background. *TDI* takes 1 for respondents from the first studied cohort (2019-2020) and 0 otherwise, while *TDII* takes 1 for respondents from the second studied cohort (2014-2015) and 0 for the remaining two cohorts. *PDI* is 1 for residents of Khyber Pakhtunkhwa province and 0 otherwise, while *PDII* is 1 for residents of Punjab province and 0 for vice versa. *PDIII* takes the value of 1 for residents of Sindh province and 0 for the remaining three studied provinces. *SHARECROPPER* is a binary variable identifying individuals affiliated with a sharecropper agro structure, with 1 denoting such affiliation and 0 otherwise. *SHCRxAGOU* represents the interaction of sharecropper agro structure and national agricultural growth.

From the Tables, we may note that female members of rural households in Pakistan earn significantly less than their gender counterparts during the studied cohorts. The findings of this study advocate the perception that gender inequality is deeply ingrained in Pakistani society, and women, in particular, face significant barriers to accessing education, employment, and other resources that could help them escape poverty (Kabeer, 1999). At the same time, poverty in Pakistan is often concentrated in rural areas, where households rely on agriculture and other low-paying activities for their livelihoods (Asghar, 2012). Women may be excluded from income-generating activities or face discrimination in accessing credit or other resources, which could limit their ability to contribute to household income (Sarwar & Chaudhry, 2021). Additionally, women in rural areas often bear the burden of domestic and caregiving work, limiting their mobility and flexibility in pursuing economic opportunities (Sarwar & Chaudhry, 2021).

Likewise, the variable *ETHNICITY* carries a negative and significant coefficient. This result denotes that the individuals belonging to the minority factions (Pashtun, Sindhi, Balochi, Saraiki, Kashmiri, and Muhajir) earn significantly less than their counter-majority faction (Punjabis) Pakistan. This result could be attributed to

the fact that these minority groups often have limited access to education and employment opportunities and face discrimination in access to resources, such as land and credit facilities (Asghar, 2012). Furthermore, these ethnic groups may also face cultural barriers that restrict women's mobility and economic participation, limiting their ability to contribute to household income and, thus, exacerbating poverty (Sarwar & Chaudhry, 2021). The findings of this study are consistent with previous research that has highlighted the role of ethnicity and culture in shaping economic outcomes in Pakistan (Sarwar & Chaudhry, 2021). The negative impact of ethnicity on poverty alleviation underscores the need for targeted policies and interventions that address the unique challenges faced by minority ethnic groups in rural areas (Nguyen et al., 2023).

EDUCATION has been found to have a significant favorable influence in raising income per capita or, by extension, reducing the poverty of the rural population in Pakistan. This finding is consistent with prior research showing that education can increase economic opportunities and improve living standards in developing countries (Sriprakash et al., 2020). One possible explanation for the positive impact of education on poverty alleviation is that education can increase productivity and earnings potential for individuals, allowing them to access higher-paying jobs and improve their standard of living. Moreover, education can also lead to improved health outcomes and reduced mortality rates, which can alleviate the burden of healthcare costs and increase the overall well-being of rural population (Cutler & Lleras-Muney, 2006).

Moreover, the time dummies (*TDI* and *TDII*) show a significant mixed impact on the poverty canvas of the rural population when compared with the baseline cohort (2010-11). In the past decade, Pakistan has experienced a mixed trend in per capita income of the rural population, as evidenced by a comparison of the Household Integrated Economic Survey (HIES) data from 2010-11, 2014-15, and 2019-20 (PBS, 2020). The steep decline of per capita income in 2014-15 in comparison to the baseline cohort is reported due to a range of factors that occurred during that time, such as weather patterns, natural disasters, and pests which significantly disadvantaged the agricultural sector to which majority of the rural population is associated (Hayat et al., 2019). After this disruption, the rural population regained their income stability in cohort 2019-20 compared to the baseline cohort (2010 -11). This upward trend in income can be attributed to a range of factors, including industrial development, expansion of the services sector, improved accessibility to funds, and growing human capital, as noted by scholars such as Perveen et al. (2020), and Afridi (2016) in their respective studies.

The last set of province dummies, PDI, PDII, and PDIII, correspond to Punjab, KPK, and Sindh, respectively, and are compared to the fourth province of the country as the baseline province, Baluchistan. The findings indicate that households in Baluchistan earn relatively higher income than those residing in the other three provinces. The latest PSLM Survey (2018-2019) demonstrates that household earnings in rural Baluchistan are expanding faster than in any other province, with the mean household income growing by 21% since 2014, when the last survey was conducted (PBS, 2020). According to the World Bank, vulnerable households in rural Baluchistan have substantially benefitted from enhanced educational and healthcare services. The Baluchistan Human Capital Investment Project, with $36

million in funds, has effectively boosted the province's human capital, leading to higher incomes over the last decade (World Bank, 2018). Additionally, Baluchistan is distinguished by a predominantly non-agrarian community. The majority of its inhabitants are engaged in the expanding service sector or mining industry, shielding them from the detrimental impacts of the struggling agricultural sector in the country (Huda et al., 2015; Kalim et al., 2018).

Turning to our key theme, we note that the coefficient of Muzara'ah agro financing structure is negative and significant. Its negative and significant coefficient prevails even when interacting with the national agricultural output (Table IV). *Muza'rah* is a financing contract used to assist small-scale farming in areas where the Muslim faith predominates (Majid, 2021). A crop-sharing partnership has proven to be an effective means of providing financial support for agricultural endeavors. This system has been widely practiced in Pakistan, particularly in rural areas, where it enhances agricultural productivity and reduces poverty (Khurshaid et al., 2021). However, our research findings and the empirical literature suggest that the *Muza'rah* system does not meet these objectives (Omar, 2020).

One of the main issues with the *Muza'rah* system is the unequal distribution of risks and benefits between landowners and farmers. Landowners are guaranteed a share of the crop yield, regardless of its quality or quantity, while farmers bear most of the costs and labor associated with cultivation. Farmers also bear most of the risks associated with crop failure, including natural disasters and market fluctuations (White & Wijaya , 2021). This unequal distribution of risks and benefits creates disincentives for farmers to invest in improving productivity, as they need a secure stake in the outcome. As a result, agricultural productivity remains low, and poverty persists in rural areas.

Another significant area for improvement with the *Muza'rah* system is farmers' need for access to credit and technical assistance. Small-scale farmers, who are the most likely to engage in *Muza'rah*, have limited access to credit and financial services, making it difficult to invest in inputs that could increase crop yields, such as fertilizers and seeds (Bashir & Azeem, 2008). Similarly, farmers need access to technical assistance, such as agricultural extension services, that could provide them with knowledge and skills to improve productivity. This lack of access to credit and technical assistance further exacerbates the existing inequalities in the system, making it even more difficult for farmers to break out of the cycle of poverty.

Additionally, the *Muza'rah* system perpetuates social inequalities in rural areas, particularly concerning gender. Women are often excluded from the *Muza'rah* system, as it is primarily a male-dominated arrangement (Memon et al, 2019). This exclusion limits women's access to land and productive resources, hindering their ability to engage in income-generating activities and reducing their overall well-being. Gender mainstreaming in agricultural development is essential for promoting gender equity and addressing the root causes of gender inequality.

Furthermore, Pakistan's agricultural sector needs more investment in infrastructure, such as irrigation systems, storage facilities, and transportation networks. This lack of infrastructure limits the ability of farmers to increase productivity and access markets, ultimately hindering their ability to improve their livelihoods (Shah et al., 2008). Additionally, climate change and environmental

degradation pose significant challenges to agricultural productivity in Pakistan. Increasingly unpredictable weather patterns and water scarcity are reducing crop yields and making farming more challenging, particularly for small-scale farmers who lack the resources to adapt to these changing conditions (World Bank, 2018).

Additionally, exploring the regulatory and market canvas, land tenure issues in Pakistan, such as insecure land tenure and unequal distribution of land, also contribute to the failure of the *Muza'rah* system. Insecure land tenure limits farmers' ability to invest in improving land productivity and makes it difficult to access credit and financial services. The unequal distribution of land perpetuates social inequalities and makes it difficult for marginalized groups to access productive resources (Kousar et al., 2015). Moreover, the *Muza'rah* system primarily focuses on subsistence agriculture, with little emphasis on market-oriented agriculture. This lack of market orientation limits farmers' ability to earn income from their crops and reduces their incentives to invest in improving productivity (Hayat et al., 2019).

V. CONCLUSION AND RECOMMENDATION

This study assesses whether the *Muza'rah* agro-financing structure mitigates rural poverty through the mediation of national agricultural output using sizable microdata from the Islamic Republic of Pakistan. The sharecropper agriculture structure is used as a proxy our focus variable (*Muza'rah* agro financing structure). We are unaware of any study using a micro data set with a large sample of 108,474 research subjects. In the analysis, we have unearthed a meaningful and consequential observation: the sharecropping dummy variable carries a negative coefficient in the per capita income equation. The findings of this study advocate the weaknesses and flaws of the *Muza'rah* agro-financing structure practiced in the rural areas of Pakistan. Due to this, it fails to accommodate the region's small-scale farmers. The results further stress the importance of a comprehensive set of policies to address the weaknesses prevailing in the current structure of *Muza'rah* agro financing so small-scale farmers of the rural community in Pakistan can realize the prescribed benefits of this financing mechanism.

The finding presented in this study significantly contributes to the literature examining the relationship between *Muza'rah* agro financing and poverty alleviation through the mediation of national agricultural output. This paper contextually examines an average-income Muslim country, Pakistan, which is an agriculture-based economy. Examining poverty alleviation in Muslim nations presents a potentially compelling avenue for future scholarly inquiry. Notably, the highest and lowest per capita incomes among such countries include Qatar, Saudi Arabia, Kuwait, Somalia, Niger, and Afghanistan. A comprehensive investigation of these income disparities would offer valuable insights and understanding for researchers seeking to deepen their knowledge of economic conditions in Muslim countries in the context of the investigated phenomenon.

Based on the conclusion drawn from this study, several policy recommendations can be proposed to address the weaknesses identified in the Muza'rah agro-financing structure and promote poverty alleviation among small-scale farmers in rural Pakistan. Firstly, there is a critical need to reform Muza'rah agro-financing

policies to better accommodate the needs of small-scale farmers. This reform should streamline the financing process, reduce bureaucratic hurdles, and ensure fair and equitable access to financial resources for all farmers. Additionally, efforts should be made to enhance financial inclusion among rural communities, particularly small-scale farmers who often lack access to formal financial institutions. This could involve providing financial literacy training, establishing microfinance institutions in rural areas, and promoting innovative financing mechanisms tailored to the needs of smallholder farmers.

Moreover, improving access to agricultural extension services can help small-scale farmers adopt modern farming techniques, increase productivity, and improve their overall livelihoods. Investing in extension services that provide technical assistance, training, and market information can empower farmers to make informed decisions and enhance their agricultural practices. Furthermore, policies should incentivize the adoption of sustainable agricultural practices that promote environmental conservation, resource efficiency, and resilience to climate change. This could include providing subsidies for eco-friendly inputs, supporting organic farming initiatives, and promoting agroecological approaches that prioritize biodiversity and soil health.

Lastly, strengthening market linkages and value chains can help small-scale farmers access markets, receive fair prices for their produce, and improve their income levels. This could involve establishing farmer cooperatives, supporting agribusiness development, and investing in infrastructure such as storage facilities and transportation networks to reduce post-harvest losses and improve market access. By implementing these policy recommendations, policymakers can address the weaknesses in the current Muza'rah agro-financing structure and create an enabling environment for small-scale farmers to thrive, ultimately contributing to rural poverty alleviation and sustainable development in Pakistan.

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APPENDIX

Data Availability Statement: The data that support the findings of this study are available from the Pakistan Bureau of Statistics Website: https://www.pbs.gov.pk/content/microdata (accessed on 08 May 2023).

Table A1.
Correlation Table to Examine Multi – Collinearity between Independent Variables

	LNINCO	LAGE	GENDER	ETHNICITY	EDUCATION	TDI	TDII	PDI	PDII	PDIII	SHARCROPPER	SHCRxAGOU
LNINCO	1.000											
LAGE	.138	1.000										
GENDER	-.101	-.219	1.000									
ETHNICITY	-.001	-.000	.006	1.000								
EDUCATION	-.027	-.033	.034	-.025	1.000							
TDI	.260	.525	-.422	.021	-.077	1.000						
TDII	-.156	-.372	.271	-.139	.040	-.642	1.000					
PDI	.210	.439	-.355	.114	-.064	.882	-.522	1.000				
PDII	-.180	-.311	.276	-.141	.072	-.599	.092	-.409	1.000			
PDIII	-.065	-.174	.124	.199	.009	-.299	.465	-.290	-.209	1.000		
SHARCROPPER	-.036	-.083	.054	.069	-.006	-.140	.212	-.131	-.073	.177	1.000	
SHCRxAGOU	-.014	-.036	.010	.034	-.004	-.029	.175	-.025	-.123	.133	.362	1.000

NOTE: *LNINCO* denotes the natural logarithm of the average monthly income of the studied research respondents. *LAGE* represents the natural logarithm of the average age of the research subjects. *GEN* is a binary variable that takes 1 if the respondent is female and 0 otherwise. *ETH* is a binary variable that captures the ethnicity of the research subjects, where 0 is for individuals from ethnic majority factions and 1 for those from the minority group. *EDU* encapsulates the educational status of research subjects, where 1 is assigned to individuals who have attained formal education. In contrast, 0 was assigned to individuals with no formal educational background. *TDI* takes 1 for respondents from the first studied cohort (2019-2020) and 0 otherwise, while *TDII* takes 1 for respondents from the second studied cohort (2014-2015) and 0 for the remaining two cohorts. *PDI* is 1 for residents of Khyber Pakhtunkhwa province and 0 otherwise, while *PDII* is 1 for residents of Punjab province and 0 for vice versa. *PDIII* takes the value of 1 for residents of Sindh province and 0 for the remaining three studied provinces. *SHARCROP* is a binary variable identifying individuals affiliated with a sharecropper agro structure, with 1 denoting such affiliation and 0 otherwise. *SHCRxAGOU* represents the interaction of sharecropper agro structure and national agricultural growth.