Impact of Gender Discrimination on Economic Asset Accumulation of Smallholder Rice Farmers Participating in USAID MARKETS II Programme in Nigeria's Kano State

Cinsiyet Ayrımcılığının Nijer'in Kano Eyaletinde USAID PİYASALARI II Programına Katılan Küçük Ölçekli Pirinç Çiftçilerinin Ekonomik Varlık Birikimi Üzerindeki Etkisi

Sanusi Mohammed SADIQ[1], Invinder Paul SINGH[2], Muhammad Makarfi AHMAD[3], Ado GARBA[4], Mahmud SARKI[5]

[1] Federal University Dutse, Faculty of Agriculture, Department of Agricultural Economics and Extension, Dutse, Nigeria
• sadiqsanusi30@gmail.com • ORCİD > 0000-0003-4336-5723

[2] Swami Keshwanand Rajasthan Agricultural University, Department of Agricultural Economics, Bikaner, India
• drsinghip.eco@gmail.com • ORCİD > 0000-0002-1886-5956

[3] Bayero University Kano, Department of Agricultural Economics and Extension, Kano, Nigeria
• amakarfi@gmail.com • ORCİD > 0000-0003-4565-0683

[4] Federal University Dutse, Faculty of Agriculture, Department of Agricultural Economics and Extension, Dutse, Nigeria
• adogarbak@gmail.com

[5] Federal University Dutse, Deapartment of Education, Dutse, Nigeria
• sarkimahmoud@yahoo.com • ORCİD > 0000-0003-3583-0234

IMPACT OF GENDER DISCRIMINATION ON ECONOMIC ASSET ACCUMULATION OF SMALLHOLDER RICE FARMERS PARTICIPATING IN USAID MARKETS II PROGRAMME IN NIGERIA'S KANO STATE

ABSTRACT:

Women's control of assets is linked to favorable development outcomes at the household and individual levels, which are crucial for poverty alleviation. The goal of this study is to give agricultural development programs advice on how to incorporate gender and assets into intervention design, implementation and assessment.The research empirically used Oaxaca-Blinder decomposition technique to isolate the impact of gender discrimination on economic asset acquisition among USAID MARKETS II rice farmers in Nigeria's Kano State. A structured questionnaire complemented with an interview schedule using an easy-cost-route approach was used to collect cross-sectional data set for the 2018 rice cropping season from 189 participating farmers selected through a multistage sampling technique. The collected data were analyzed using both descriptive and inferential statistics. From the empirical evidence, it was established that gender differentials had both an effect and an impact on the economic capital acquisition of the two gender groups with a disadvantage or negative consequence on the female farmers. Besides, in isolating the impact of the gender differential, it was observed that gender discrimination due to gender inequality in access and control of productive resources accounts for a major part of the gap in the economic capital acquisition, thus affected women's economic capital accumulation. Thus, the study suggests a mechanism of gender budget mainstreaming in order to establish gender equality and equity, thereby enhancing the growth and development of the farm economy and the aggregate economy of the state in particular and the nation in general.

Keywords: *Access, Resorces, Equality, Gender, Programme, Nigeria*

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CINSIYET AYRIMCILIĞININ NİJER'İN KANO EYALETİNDE USAID PİYASALARI II PROGRAMINA KATILAN KÜÇÜK ÖLÇEKLİ PİRİNÇ ÇİFTÇİLERİNİN EKONOMİK VARLIK BİRİKİMİ ÜZERİNDEKİ ETKİSİ

ÖZ:

Kadınların varlıkları kontrol etmesi, yoksulluğun azaltılması için çok önemli olan hane ve bireysel düzeylerde olumlu gelişme sonuçlarıyla bağlantılıdır. Bu çalışmanın amacı, toplumsal cinsiyet ve varlıkların müdahale tasarımına, uygulanmasına ve değerlendirilmesine nasıl dahil edileceğine dair tarımsal kalkınma

programlarına tavsiyelerde bulunmaktır. Araştırma, USAID MARKETS arasında cinsiyet ayrımcılığının ekonomik varlık edinimi üzerindeki etkisini izole etmek için ampirik olarak Oaxaca-Blinder ayrıştırma tekniğini kullandı. Nijerya'nın Kano Eyaletindeki II pirinç çiftçileri. Çok aşamalı bir örnekleme tekniği ile seçilen 189 katılımcı çiftçiden 2018 pirinç mahsul sezonu için kesitsel veri seti toplamak için kolay maliyet-yol yaklaşımı kullanan bir görüşme programı ile tamamlanan yapılandırılmış bir anket kullanıldı. Toplanan veriler hem tanımlayıcı hem de tanımlayıcı kullanılarak analiz edildi. ve çıkarımsal istatistikler. Ampirik kanıtlardan, cinsiyet farklılıklarının, iki cinsiyet grubunun ekonomik sermaye kazanımı üzerinde hem etkisi hem de etkisi olduğu ve kadın çiftçiler üzerinde dezavantajlı veya olumsuz bir sonucu olduğu tespit edilmiştir. Ayrıca, toplumsal cinsiyet farklılığının etkisinin izole edilmesinde, ekonomik sermaye kazanımındaki boşluğun önemli bir bölümünü üretken kaynaklara erişim ve kontrolde cinsiyet eşitsizliğine bağlı cinsiyet ayrımcılığının oluşturduğu ve dolayısıyla kadınların ekonomik sermaye birikimini etkilediği görülmüştür. Bu nedenle çalışma, toplumsal cinsiyet eşitliğini ve eşitliğini tesis etmek ve böylece tarım ekonomisinin ve özel olarak devletin ve genel olarak ulusun toplam ekonomisinin büyümesini ve gelişmesini artırmak için toplumsal cinsiyete dayalı bütçeyi ana akımlaştırma mekanizması önermektedir.

Anahtar Kelimeler: *Erişim, Kaynaklar, Eşitlik, Cinsiyet, Program, Nijerya*

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1. INTRODUCTION

When describing resources that individuals, families, or other entities (groups, corporations) hold, the term "asset" is often used extremely loosely. Conventional, privately held productive and financial wealth, as well as social, geographic, and market access advantages that impart economic advantage, are defined as assets by Carter and Barrett (2006) and Johnson *et al*. (2015). Another way assets are discussed in international development literature is through the Sustainable Livelihoods paradigm (Njuki *et al*., 2014; Olney *et al*., 2015; Johnson *et al*., 2016). Natural (land, water), physical (agricultural and household durables), financial (cash or savings), human (health, knowledge, skills), and social (group membership, social networks) capitals are recognized in this framework, and these capitals are posited to underpin households' ability to engage in livelihood strategies. The ownership and control of an asset are important aspects of its definition (Johnson *et al*., 2016).

Women's control of assets is linked to favorable development outcomes at the household and individual levels, which is crucial for poverty alleviation (Quisum-

bing *et al.*, 2015; Johnson *et al.*, 2016). Gender equality is a foundation for addressing the difficulties of poverty reduction, sustainable development, and good governance, rather than a goal in and of itself (Sadiq *et al.*2020b).For many years, development interventions focused on raising incomes to alleviate poverty. However, a growing body of evidence now emphasizes the importance of assets for poverty reduction (Naschold, 2012 and 2013; Paris *et al.*,2015), as well as for individuals' and households' current and long-term well-being (Schreiner and Sherraden, 2007; Johnson *et al.*, 2016). There is also research on the value of women's wealth ownership and control for a variety of development outcomes, both for women and their families (Meinzen-Dick*et al.*, 2011; Paris *et al.*, 2015). Men, on the other hand, have a general advantage in asset ownership due to the gender norms that regulate asset ownership, which implies they own more assets and assets of higher value than women (Deere *et al.*, 2013; Quisumbing *et al.*, 2015; Johnson *et al.*, 2016).

While increasing women's assets has become a global development priority (FAO, 2011; Meinzen-Dick *et al.*, 2011; Deere *et al.*, 2013; Savath *et al.*, 2014; van den Bold *et al.*, 2015), few agricultural initiatives evaluate their effects on individual or household assets. By influencing who participates (and who does not), as well as how and how much they benefit, assets can impact the design, implementation, and outcomes of programs. The gendered allocation of assets is governed by societal standards, although it is not unchangeable. Agricultural development programs have the potential to change the asset distribution between men and women. This could be accomplished directly, for example, through direct wealth transfers to women or through training, possibly in conjunction with attempts to change attitudes. It can also happen inadvertently, as a result of projects' downstream effects on gendered income control and investment prospects. These latter consequences may be inadvertent, but if women's access to or control over assets is weakened, they may suffer poor consequences.

Because the majority of impoverished women in Africa live in rural regions, researching their empowerment status and the factors that influence it is a useful tool for conquering poverty (Obayelu and Chime, 2020). In rural Nigeria, there is little empirical research on multidimensional women's empowerment. As a result, this study provides a clear understanding of the drivers of women's empowerment in rural Nigeria, and its findings will serve as guiding documents for policymakers as they design gender-responsive intervention programs and implement true gender mainstreaming in Nigerian rural development policy. Furthermore, the findings would add to the expanding body of information on women's empowerment in Nigeria's Kano state, the country as a whole, and the developing globe, particularly through empirical studies. Thus, this research on the isolating impact of gender discrimination on economic capital asset accumulation was conceptualized. The

specific objectives were to describe the socio-economic profile of the respondents; determine the effect and impact of gender differential on economic capital asset accumulation; and, isolate the impact of gender discrimination on the economic capital accumulation.

2. Materials and Methods

Nigeria's Kano state is located in the northern section of the country, with latitudes ranging from 10° 33 to 12° 37N and longitudes ranging from 07° 34 to 09° 25E of the Greenwich meridian time. Northern-Guinea savannah and Sudan savannah, respectively, characterize the northern and southern regions of the state's vegetation. The annual rainfall ranges from 600-1200 mm in the Northern-Guinea savannah to 300-600 mm in the Sudan savannah. Furthermore, arable crop growth seasons in the Sudan savannah region range from 90 to 150 days, whereas they range from 150 to 200 days in the Northern-Guinea savannah region. The state's population is expected to be 9.4 million people (NPC, 2006), with a population growth rate of about 3.5 percent per year. The state has over 1,754,200 hectares of arable land. The state is well-known for its commercial activities, with the majority of its residents working in agricultural commodities trading.

A multi-stage sampling technique was used to select 195 farmers from the project sites as a representative sample size. The purposive selection of six (6) participating Local government areas (LGAs) out of the nine (9) LGAs designated for USAID MARKETS II program in the state was based on a high concentration of smallholder rice producers in the first stage. Bunkure, Garun-Mallam, Kura, Dambatta, Bagwai, and Makoda are the LGAs chosen. Secondly, five (5) participating localities were chosen at random from each of the identified LGAs. In the third stage, nine (9) farmers were chosen at random from Bunkure, Garun-Mallam, and Kura LGAs, while four (4) farmers were chosen at random from Dambatta, Bagwai, and Makoda LGAs. Thus, a total of 195 farmers constituted the representative sample size. However, only 189 questionnaires were deemed legitimate, thus subjected to examination. The data for the 2018 rice cropping season was gathered using a well-structured questionnaire complemented with interview schedule. Objectives I, II and III were achieved using descriptive statistics; Chow-test and Average treatment effect; and, Endogenous switching regression and Oaxaca-Blinder decomposition models, respectively.

Empirical model:

1. Chow F-statistic test

Following Amaefula *et al.* (2012); Sadiq *et al.*(2020a&b); Sadiq *et al.*(2021), the

F-statistics tests for the test for effect of gender differential, test for homogeneity of slopes, and test for differences in intercepts are given below:

To isolate the effect of gender differential, the error sum of squares for asset function of: (i) women gender (ii) men gender (iii) pooled data without a dummy variable (iv) pooled data with a dummy variable (men =1, women =0) area as follows:

Test for effect of gender differential:
$$F^* = \frac{[\sum \varepsilon_3^2 - (\sum \varepsilon_1^2 + \sum \varepsilon_2^2)]}{(\sum \varepsilon_1^2 + \sum \varepsilon_2^2)} \qquad (1)$$

Where and are the error sum of square and degree of freedom respectively for the pool(women and men), and are the error sum of square and degree of freedom respectively for the women group, and, and are the error sum of square and degree of freedom respectively for the men group.

If the F-cal is greater than the F-tab, it implies that the gender differential has an effect on the economic capital asset accumulation of the women gender.

Test for homogeneity of slope:
$$F^* = \frac{[\sum \varepsilon_4^2 - (\sum \varepsilon_1^2 + \sum \varepsilon_2^2)]/[K_4 -]}{(\sum \varepsilon_1^2 + \sum \varepsilon_2^2)/K_1 + K_2}$$

$$(2)$$

Where and are the error sum of square and degree of freedom respectively for the pool (both women and men gender) with a dummy variable.

If the F-cal is greater than the F-tab, it implies that gender differentialbrings about a structural change or shift in the economic capital assetparameter.

Test for differences in intercepts:
$$F^* = \frac{[\sum \varepsilon_3^2 - \sum \varepsilon_4^2]/[K_3 -}{\sum \varepsilon_4^2/K_4}$$

$$(3)$$

If the F-cal is greater than the F-tab, it implies that the assetof the women group differs from that of the men group.

2. Average treatment effect (ATE)

It depicts the average outcome difference between units assigned to care and units assigned to placebo (control). The following equation is based on Lokshin and Sajaia(2011); Wang *et al.*(2017); Sadiq *et al.*(2020a&b); Sadiq *et al.*(2021):

Gender index of the womenis given by: $E(y_{1i}|I = 1; X)$ (4)

Gender index of the men is given by: $E\left(y_{1i}\middle| I = 0; X\right)$ (5)

Gender index of the women if there is no gender differenceis denoted by:

$E\left(y_{1i}\middle| I = 1;\right.$ (6)

Gender index of the men if there is gender differenceis denoted by:

$E\left(y_{1i}\middle| I = 0; X\right)$ (7)

Where:

$E(.)$ = Expectation operator

y_{1i} = Capital of the women farmers(dependent variable)

y_{2i} = Capital of the men farmers(dependent variable)

I = Dummy variable (1 = women, 0 = men)

X = Explanatory variables that is common to both women and men farmers.

$$ATT = E(y_{1i}|I = 1; X) - E(y_{2i}|I = 1; X) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (8)$$

$$ATU = E(y_{1i}|I = 1; X) - E(y_{2i}|I = 1; X) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (9)$$

Average Treatment effect on Treated = ATET

Average Treatment effect on Untreated = ATEU

Equations (8) and (9) were further simplified as:

$$ATT = \frac{1}{N_1}\sum_{i=1}^{N_1}[p(y_{1i}|I = 1; X) - p(y_{2i}|I = 1; X)] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

$$ATU = \frac{1}{N_2}\sum_{i=1}^{N^2}[p(y_{2i}|I = 0; X) - p(y_{1i}|I = 0; X)] \ldots\ldots\ldots\ldots\ldots\ldots\ldots.$$

Where, and are number of women and men farmers respectively, and = probability.

Endogenous switching regression model: Y = Capital asset (TLU, Dead stock and CI);= Age (year); = Marital status (married =1, otherwise=0);= Educational level (year);= Secondary occupation (yes= 1, otherwise=0); = Household size (number); = Rice farming experience (year); Extension contact (yes=1, otherwise=0);

= Mixed cropping (yes= 1, otherwise=0);= Length of participation in MARKETS II (year); = Duration of adoption of Urea displacement project (UDP)(year); = proportion of farm size cultivated under UDP (%);= Total livestock unit (TLU) (Camel=1.0; Horse=0.8; Cattle=0.7; Donkey=0.5; Sheep & Goat =0.1; and, Chicken=0.01); = Commercialization index (CI)(ratio of marketed surplus to marketable surplus); = Rice farm size (ha); and, = Dead stocks (capital assets); = Intercept;= Regression coefficient; and, = Stochastic.

3. Oaxaca-Blinder decomposition model

With reference to Marwa (2014); Revathy *et al.*(2020); Sadiq *et al.*(2020a&b); Sadiq *et al.* (2021) the degree to which the capital asset disparity between women and men farmers can be explained by differences in observed human capital characteristics was investigated using the standard Oaxaca-Blinder technique (Oaxaca 1973; Blinder 1973). The following are the capital asset functions:

$$ln\bar{Y}_F = \beta_0 + \beta_i \sum_{i=1}^{i} X_i + \varepsilon_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (12)$$

$$ln\bar{Y}_M = \beta_0 + \beta_i \sum_{i=1}^{i} X_i + \varepsilon_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (13)$$

Where, = average capital asset value of women farmers; = average capital asset value of men farmers; $X_{i-n} = explanat$; and,

The total difference can be explain by, ………………………………………….. (14)

The Oaxaca-Blinder decomposition equation is,

$$ln\bar{Y}_F - ln\bar{Y}_M = (\bar{X}_{F|} \dots\dots\dots\dots (15)$$

$$\therefore ln\bar{Y}_F - ln\bar{Y}_M \dots\dots\dots\dots (16)$$

Where the first and the second terms respectively, captured the endowment effect (characteristics differences between the women and men) and the discrimination effect.

3. Results and Discussion

3.1 Socio-economic profile of the farmers

Based on the mean age values of the working population vis-à-vis 42 years and 36 years for men and women, respectively, it can be suggested that the women working population is much younger than that of their men counterparts (Table 1). However, both fall within the economically active age group; the working category of the women folk is more promising than that of men who are ageing. This showed a drift of farm labour to white-collar jobs among the much younger male farmers, thus living farm activities behind for women, a vulnerable group constrained by gender stereotype. Besides, there is little or no hope of labour replacement among the men folk due to farm labour migration to preferred white-collar jobs. Thus, it is very obvious that in the near future, women folk will champion the upstream rice supply chain in the studied area: the future of rice farming will be in the hands of farm women. Furthermore, there is improvement in women involvement in the upstream rice supply chain against the odd of gender stereotype as indicated by the women to men percentage ratio of 39:61%. The possible reasons might be the program tacit focus on women and youth, and women folk steadfast against the vicious cycle of poverty.

It was observed that the married population of women folk is more than that of their men counterparts as evidenced by the married percentage ratio of women folk which is marginally higher than that of their men counterparts i.e. 93.15:90.52%. Besides, on the average, the women farmers maintained a larger household size (11 persons) than their men counterpart (8 persons). By implication, the women folk have more family responsibilities to carter for as against their men counterpart. When male farmers make money from crop sales, they either reinvest it in increasing agricultural output or spend it on personal items. Their earnings have little effect on the quality of food available to their families. When women farmers make money, even if it is a small amount, it is more likely to be spent on the family's food (Sadiq *et al.*, 2020b).

The average literacy level of the women folk is very poor as against their men counterparts who on the average acquired post-primary education as indicated by the year of schooling ratio of 2:8 years in respect of women and men. By implication, the innovation reception level of the women farmers is affected, thus making them inescapable from the vicious cycle of poverty. This poor educational level of women folk is expected as gender stereotype-religion and culture attached less value and importance to girl child education. Some societies see education expenditure on a girl child as a waste of resources- money. An Indian proverb goes that raising girls is like watering someone else's lawn. From the moment they are born,

girl children are viewed as a burden rather than a joy. As a result, women have a low literacy rate. According to a World Bank cost-benefit analysis, if women obtained the same level of education as males, farm yields would improve by 7 to 22%, while improving women's elementary schooling alone might raise agricultural output by 24% (Kumari, 2020). Also, it allows women to earn more money. According to a recent International Labor Organization (ILO) report, each additional year in education increased a woman's earnings by roughly 15%, compared to only 11% for a man (Kumari, 2020).

In terms of experience, male farmers had more longevity of experience in rice production, thus more experienced than women. This may be attributed to their advantage in access and control over productive resources due to gender stereotype, thus making them efficient mangers in resource allocation. Likewise, the comparative advantage benefit of gender inequality among male farmers makes them highly engaged in enterprise diversification as a safety and income security measures compared to their female counterparts. Women have limited access to marketing facilities and services, limiting their ability to expand their sources of revenue. Despite the fact that women contribute as traders, hawkers, and street vendors, gender issues in marketing are not well addressed. They are not given the opportunity to receive training in marketing skills such as negotiations, price fixing, and book keeping.

Since the upstream rice supply chain is program-driven, both genders had adequate access to extension contact as indicated by the extension contact percentage ratio of 99.14:98.63% for men and women respectively. For the duration of participation in the program-MARKETS II, there is not much difference but the men have put in more months-6 months than the women. This suggests easy access to information vis-à-vis exposure owing to gender stereotype. Likewise, for the length of adoption of UDP, the men category had adopted the technology for more than a year compared to their women counterpart. Farm women must be exposed to the most recent innovations in farming technology in order to improve their technical abilities, which leads to higher production on the farm and at home. Despite the fact that farm women have made their presence felt in all aspects of agriculture, socio-cultural norms often prevent them from having outside exposures such as field trips, mass media, information, farm periodicals, technology, stakeholders, organizations, and so on.Despite men involvement in the program and adoption of innovation before the women category, findings showed that the proportion of the farm size adopted under UDP by women category is marginally higher than that of their men counterpart.

For the TLU, the livestock asset unit of the men category is higher than that of their women counterpart by 40%. Likewise, the dead-stock asset of the male gen-

der is higher than that of the female gender by 62.1%. Both genders on the average are marginal farmers; with a potential rice yield of 47.28 and 39.44 quintals for men and womenrespectively. However, both genders have a low marketable surplus, necessitating a return to market to shore-up for household and farm consumptions.

Table 1. Socio-economic profile of the genders

Items	Male		Female		t-stat
	Mean	SD	Mean	SD	
Gender	0.613757	-	0.386243	-	-
Age	42.00862	8.485936	36	10.82179	2.501**
Marital status	0.905172	0.421637	0.931507	0.254338	-1.157^{NS}
Educational level	7.534483	3.034981	2.178082	3.683079	7.152***
Primary occupation	0.87931	0.516398	1	0	-2.977***
Secondary occupation	0.422414	0.918937	0.164384	0.373188	4.260***
Household size	8.206897	6.008328	11.08219	7.086281	-3.160***
Experience (rice)	16.02586	5.846176	6.60274	5.987811	8.875***
Extension contact	0.974138	0	0.657534	0.477818	4.964***
Mixed cropping	0.991379	0	0.986301	0.117041	1.00^{NS}
Length of particip. in MKT11	3.931034	1.080123	3.369863	1.230479	3.146***
Length of adoption of UDP	3.422414	2.321398	2.452055	1.716271	3.316***
% of farm under UDP	48.92241	5.163978	56.23288	32.02409	-0.578^{NS}
Co-operative membership	0.896552	0	1	0	-2.763***
TLU	1.443793	1.065327	0.865753	0.802762	2.113**
CI	0.703465	0.097963	0.706389	0.159194	-6.081***
Rice farm size	0.869138	1.008949	0.597123	0.520557	3.418***
Dead-stock (₦)	100379.1	145448.5	38097.12	49857.72	3.251***
Yield (quintal)	47.27852	23.85093	39.43951	24.10239	2.279**

Source: Field survey, 2018

Note: *** ** * &NS means significant at 1%, 5%, 10% & Non-significant, respectively.

3.2 Effect of gender differential on economic capital asset accumulation

A cursory review of the results showed that gender differential has effect on the TLU-livestock asset accumulation, dead-stock asset accumulation and commercialization level-marketable surplus of the men folk as indicated by their respective F-statistics which are within the acceptable marginof 10% degree of freedom (Table 2). Besides, for the homogeneity of slope, gender differential *viz.* gender inequality i.e. head advantage of access and control of productive resources against the women folk brought about a structural change in the resource endowment of the men farmers as evidenced by the respective calculated F-statistics of the assets, which are different from zero at 10% probability level. Furthermore, for the test of heterogeneity of the intercept, except TLU, it was observed that there is a difference in the managerial efficiency of women against the men vis--vis dead stock asset accumulation and commercialization level as indicated by their respective F-statistics which are within the plausible margin of 10% probability level. This difference in the managerial efficiency with men being better managers than the women is largely due to gender stereotype viz. religion and cultural phenomenon which place women in the back seat of household responsibility.

Table 2. Effect of gender differential on asset accumulation

Asset	Items	ESS	DF	Test	F-stat
TLU	Female	31.0235	71		
	Male	222.837	114	I	21.49387***
	Pooled	283.3548	186	II	15.94064***
	Pooled with dummy	280.9491	186	III	1.592674[NS]
Dead-stock	Female	92.04461	71		
	Male	99.08724	114	I	18.29603***
	Pooled	210.0343	186	II	9.082321***
	Pooled with dummy	205.962	186	III	3.677609***
CI	Female	1.18	71		
	Male	2.675372	114	I	29.60103***
	Pooled	4.472253	186	II	15.79673***
	Pooled with dummy	4.338005	186	III	5.756132***

Source: Field survey, 2018
*Note: *** ** * &NS means significant at 1%, 5%, 10% & Non-significant, respectively.*

3.3 Impact of gender differential on economic capital asset accumulation

A cursory review of the treatment-effect estimations *viz.* nearest-neighbor matching showed that gender differential has a negative significant impact on the livestock asset's accumulation (TLU)- differed cash reserve of women folk as indicated by its estimated ATE coefficient which is within the acceptable margin of 10% (Table 3). This implies that gender inequality and gender stereotypes, manifestations of religious and cultural barriers hinder women folk access to and control of productive resources, thus affected their physical ownership possession of livestock-differed cash reserve in the studied area. The consequence of the gender differential makes the TLU of the women folk to be 0.48 less than that of their men counterpart as evidenced by the estimated ATE coefficient value of -0.48. Therefore, on the average, it can be inferred that due to the gender differentials, the men farmers have livestock possession comparative advantage of four heads of sheep/goats and eight chickens against their female counterpart. Furthermore, because of the gender status of a farmer as a woman, the women farmers lost a TLU of -0.559 while the men farmers gained a TLU of 0.435 because of their gender status as male as indicated by the plausibility of ATET and ATEU coefficients respectively at 10% probability level. Thus, on the average, the equivalent livestock possession lost by a woman farmer is five heads of sheep /goats and six chickens. Whereas, for the male gender, on the average, the equivalent livestock possession gained is four heads of sheep/ goats and four chickens.

For the treatment-effect estimation, both between (ATE) and within (ATET/ATEU) *viz.* regression estimation, propensity score matching, and inverse-probability weight, the empirical evidences showed no impact of gender differential on livestock asset's possession (TLU) of the women folk as evidenced by their respe-

ctive ATE and ATET/ATEU which were not different from zero at 10% degree of freedom.

For the dead-stock, the nearest-neighbor estimation showed gender differential to have negative-significant impact on the dead-stock accumulation of the women folk, thus plummeted their dead-stock possession by ₦37328.73 against their male counterpart as indicated by its ATE coefficient which is within the acceptable margin of 10% probability level (Table 3). Thus, it can be inferred that gender inequality and gender stereotype due to cultural and religious constraints affected women farmers' acquisition of dead-stock *viz.* farm production implements, thus inhibit their active involvement in the upstream supply chain of rice production in the studied area. Besides, due to the gender differential, the women folk lost dead-stock assets worth ₦40437.26 against their male counterpart that gained ₦35372.50 due to advantage of gender inequality by the latter. The foregoing loss and gains were based on the negative and positive significant of the ATET and ATEU coefficients respectively. For the treatment-effect estimation *viz.* regression adjustment and propensity-score matching, between the gender categories, it was observed that inspite of the declined dead-stock accumulation worth of the women folk against their men counterpart; gender differential has no impact on the dead-stock asset accumulation as indicated by their respective ATE coefficients which were not different from zero at 10% probability level. Within the women category, a lost due to gender differential was observed in the dead-stock accumulation of both regression adjustment and propensity-score matching estimations as evidenced by the negativity of their respective ATETs coefficient. However, the impact of gender differential on dead-stock's asset lost shown by the regression adjustment estimation was not significant while that of propensity-score matching was significant, thus translate into assets lost of ₦11322.08 as revealed by its estimated ATET coefficient of 11322.08. Besides, within the male category, gender differential brought about a gain in their dead-stock assets accumulation as evidenced by the positivity of both the regression adjustment and propensity-score matching ATEUs estimation; except that it has a significant impact in the former and a non-significant impact in the latter.

The regression adjustment and inverse-probability weights of the treatment-effect estimations showed that gender differential has a positive-significant impact on the commercialization level-marketed surplus of the women folk, thus making their marketed surplus higher than that of their men counterpart by 0.085 and 0.044 respectively, as evidenced by their respective ATE coefficients which were within the acceptable margin of 10% probability level (Table 3). The possible reason may be attributed to women's adequate utilization of market intelligence as both categories fully participate in co-operative association. Women folk in the studied area are active in marketing supply chain, thus vibrant observant of market

outlook and market information against their male counterparts who are more active in the upstream aspect of rice enterprise-production. This didn't come as a surprise as gender inequality-cultural and religious phenomena are barriers to women's access to and control of productive resources, which is very pertinent in the upstream supply chain of rice production. Thus, owing to the gender stereotype which gives them some leverage to participate in the downstream supply chain, they tend to explore the potentials of the downstream supply chain so as to delineate themselves from the vicious cycle of poverty as they belong to the weaker section of the society-vulnerable group. Furthermore, it was observed that due to the proficient utilization of market intelligence, they gained a marketed surplus of 0.136 as indicated by the regression adjustment estimated ATET coefficient which is positive and is within the acceptable margin of 10% degree of freedom. Besides, the ATEU estimated coefficient of the regression adjustment showed a loss in marketed surplus for the men category due to gender differential, but the influence was non-significant as indicated by the negativity and non-plausibility of its estimated ATEU parameter at 10% degree of freedom. Though non-significant (ATET), the empirical evidence from the inverse-probability weight showed that due to gender differential, the women folk lost a marketed surplus of 0.037 which would have been gained if not for gender differential. Likewise, the negative-significant of the ATEU coefficient implied that the men category lost a marketed surplus of 0.066. A similar result was shown by the propensity-score matching ATEU estimated coefficient that revealed a plummeted marketed surplus lost of 0.037 for men as evidenced by its negativity and plausibility at 10% probability level. The possible reason may be attributed to poor market intelligence of the men gender. It is noteworthy to mention that between the gender categories of the treatment effect estimation *viz.* propensity-score matching and nearest-neighbor matching, gender differential has no impact on commercialization-marketed surplus of women as indicated by their respective ATE estimated coefficients which were not different from zero at 10% probability level. Within each category, ATET/ATEU estimated coefficients of nearest-neighbor matching are not within the plausible margin of 10% probability level, thus implies non-significant impact of gender differential on commercialization level of the studied genders. Likewise, for the women group, the ATET coefficient of the propensity-score matching showed no significant impact of gender differentials on the commercialization level of the women folk as evidenced by the parameter which is not different from zero at 10% degree of freedom.

Table 3. Impact of gender differential on asset accumulation

Items	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat		
TLU	Regression adjustment		Propensity-score matching		Nearest-neighbor matching		Inverse-probability weight	
ATE	-0.3536(0.29148)	1.21NS	-0.0974(0.2462)	0.40NS	-0.4824(0.1984)	2.43**	-0.0042(0.1581)	0.03NS
ATET (F)	-0.7700(0.4792)	1.61NS	-0.1927(0.1670)	1.15NS	-0.5586(0.2971)	1.88*	-0.1666(0.1591)	1.05NS
A T E U (M)	0.0928(0.3062)	0.30NS	0.0377(0.3557)	0.11NS	0.4347(0.2066)	2.10**	0.0469(0.1655)	0.28NS
Mean (F)	1.1713(0.1895)	6.18						
M e a n (M)	1.5248(0.2230)	6.84						

Dead stock								
ATE	-32802.58(21115.19)	1.55[NS]	-8676.74(21528.74)	0.40[NS]	-37328.73(15398.26)	2.42**		
ATET (F)	-25614.48(32077.65)	0.80[NS]	-11332.08(3361.32)	3.37***	-40437.26(15160.55)	2.67***		
A T E U (M)	37326.12(21975.1)	1.70*	7014.26(29953.35)	0.23[NS]	35372.5(19679.19)	1.80*		
Mean (F)	53413.97(12348.58)	4.33***						
M e a n (M)	86216.55(17597.48)	4.90***						
CI								
ATE	0.0845(0.0283)	2.99***	0.0110(0.0136)	0.81[NS]	0.0158(0.0261)	0.61[NS]	0.0439(0.0205)	2.14**
ATET (F)	0.1364(0.0386)	3.53***	-0.0298(0.0495)	0.60[NS]	0.0170(0.0316)	0.54[NS]	-0.0371(0.0334)	1.11[NS]
A T E U (M)	-0.0520(0.0349)	1.49[NS]	-0.0366(0.0039)	9.32***	-0.0150(0.0290)	0.52[NS]	-0.0658(0.0165)	3.97***
Mean (F)	0.7411(0.0209)	35.31***					0.7632(0.0138)	54.98***
M e a n (M)	0.6566(0.0198)	33.11***					0.7192(0.0152)	47.15***

Source: Field survey, 2018

Note: *** ** * &NS means significant at 1%, 5%, 10% & Non-significant, respectively.

F= Female; M=Male

3.4 Economic capital asset gap due to gender discrimination

The result of the gender differential on the TLU showed that gender discrimination- a structural difference accounted for 89.21% of the TLU (livestock's asset accumulation) differential between women farmers and men farmers (Table 4). The endowment effect, a socio-economic related characteristics, accounts for 10.79% of the TLU gap differential. . Likewise, the gaps in dead stock and commercialization index (CI)-marketable surplus between the two gender groups majorly owe to gender discrimination. The structural difference called gender discrimination and endowment effect respectively accounted for 64.54 and 35.46%; and, 83.26 and 16.74% in respects of dead-stock asset and CI gaps between the female and male farmers (Table 4). Besides, the contribution of the different factors towards the economic capital asset accumulation difference between the two strata is due to the differences of the regression coefficients of the independent variables of the respective asset accumulation endogenous switching regressions.

For the TLU, the empirical evidences showed endowed related factors of the farmers *viz.*marital status, secondary occupation, household size, length of adoption of UDP, proportion of farm size adopted for UDP, CI and dead-stock contributed favourably to the women farmers, while age, educational level, rice farming experience, mixed cropping, extension contact, length of participation in MARKETS II and farm size contributed favourably to the men farmers. In the case of dead-stock asset, the contribution of endowment related factors-age, secondary occupation, household size, length of participation in MARKETS II, proportion of farm size adopted under UDP and TLU favoured the women folk while the contribution of marital status, educational level, rice farming experience, mixed cropping, extension contact, length of adoption of UDP, CI and farm size favoured the men farmers. For the CI, the endowment related factors such as secondary occupation, household size, rice farming experience and proportion of farm size adopted

for UDP contributed favourably to the women stratum, whereas age, marital status, educational level, mixed cropping, extension contact, length of participation in MARKETS II, proportion of farm size adopted for UDP, TLU and rice farm size contributed favourably to the men stratum. Therefore, it can be inferred that secondary occupation and household size; and, educational level, mixed cropping and extension contact; are the distinct endowment related factors that favourably contributed to women and men farmers respectively.

The mean values of the women and men farmers cum the gaps for the TLU-livestock asset, dead-stock asset and CI-marketable surplus are 0.866, 1.444 and 0.578; ₦38097.12, ₦100379.10 and ₦62282; and, 0.706, 0.704 and 0.003 respectively. Out of the TLU gap of 0.578, the difference due to superior endowment of the men farmers is 0.062 while the difference due to gender discrimination is 0.516. Out of the dead-stock asset gap of ₦62282, superior endowment of the men farmers accounted for ₦22084.10 while ₦40197.90 owes to gender discrimination. Out of the CI gap of 0.003, superior endowment of the women folk is 0.001 while gender discrimination is 0.002. Thus, it can be concluded that the consequence of gender discrimination *viz.* gender inequality and gender stereotype made the women folk to lost TLU- livestock asset index of 0.516, approximately five sheep/goats plus two chickens; dead-stock asset value of ₦40197.90; and, a marketable surplus of 0.002%. The discrimination values represent 59.57, 105.1 and 0.35% of the actual average values of TLU, dead-stock asset and CI respectively.

Given the endowment-related factors at women farmers' disposal, if given equal access and control to productive resources as their male counterparts-gender equality-coupled with an environment free of gender stereotypes, the actual average TLU-livestock asset index, dead-stock asset, and CI should be 1.38, ₦78295.07, and 0.704, respectively.

The parts of the TLU and CI gaps that can be explained by the differences in covariates are positive among the women folk while in the case of the dead-stock asset it is negative among the women group. For the former, it implies that relative to the men group, the women farmers, on the average, have fewer characteristics that are associated with higher TLU and CI indexes,whereas, for the latter, the women folk in relation to the men group have more characteristics that are associated with higher dead-stock asset accumulation.In a closely related research, Mukasa and Salami (2016a) found a productivity gap due to gender differential in a cross-country survey in sub-Saharan Africa *viz.* Nigeria, Uganda and Tanzania. They inferred that closing the gender productivity gap would increase productivity gains by 2.8, 10.3 and 8.1 in Nigeria, Uganda and Tanzania respectively. Consequently, it raised monthly consumption per adult equivalent and minimized poverty among women folk. Similarly, Tabari and Elmi (2015) reported that gender inequality had

a negative effect on the economic growth in Iran. They opined on the need to reduce gender gaps to enhance economic growth. In the same vein, a large number of studies (Partovi *et al.*, 2009; Oseni *et al.*, 2013; Palacios-López and López, 2015; Mukasa and Salami, 2016b) confirmed that gender inequality impeded economic growth. Thus, the exemption of women from opportunities affects not only them but the entire society.

Table 4. Asset gap due to gender discrimination

Items	Mean		TLU coefficient		Dead stock coefficient		CI coefficient
	F	M	F	M	F	M	F
Intercept			-0.71919	-3.06056	7.482071	8.594221	0.565293
Age	36	42.00862	0.002161	0.00393	-0.00489	0.005693	0.002587
Marital status	0.931507	0.905172	0.281696	0.211937	-0.64163	0.424961	-0.09228
Educational level	2.178082	7.534483	0.061744	-0.04673	0.032958	0.045559	0.009791
Secondary occupation	0.164384	0.422414	-0.05756	-0.34272	-0.3437	0.091354	-0.03238
Household size	11.08219	8.206897	0.024403	0.036157	0.052377	-0.0081	0.00704
Experience (rice)	6.60274	16.02586	0.027569	-0.00288	0.015272	-0.00104	-0.00211
Extension contact	0.657534	0.974138	0.383868	-1.1513	1.206927	0.520235	0.058605
Mixed cropping	0.986301	0.991379	0.581011	0.62163	1.715577	-0.27569	0.031247
Length of participation in MKT11	3.369863	3.931034	0.008869	0.161084	-0.02051	0.017336	0.007361
Length of adoption of UDP	2.452055	3.422414	-0.02499	0.063991	0.000755	0.004601	0.003037
% of farm under UDP	56.23288	48.92241	0.007426	-0.00117	0.007798	-0.00059	0.000513
TLU	0.865753	1.443793	-	-	-0.22585	0.139846	0.007528
CI	0.706389	0.703465	0.197918	0.390265	-0.68731	0.681053	-
Rice farm size	0.597123	0.869138	0.089065	0.458525	0.443063	0.507596	0.017749
Dead-stock (₦)	38097.12	100379.1	-0.07612	0.3145	-	-	-0.00881

Source: Field survey, 2018

Table 4. Continued ……………………

Items	CI coefficient M	TLU decomposition		Dead stock decomposition		CI decomposition	
		$\beta_F(\bar{X}_F - \bar{X}_M)$	$\bar{X}_M(\beta_F - \beta_M)$	$\beta_F(\bar{X}_F - \bar{X}_M)$	$\bar{X}_M(\beta_F - \beta_M)$	$\beta_F(\bar{X}_F - \bar{X}_M)$	$\bar{X}_M(\beta_F - \beta_M)$
Intercept	0.441498		2.341371		-1.11215		0.123795
Age	-0.00393	-0.01298	-0.0743	0.029373	-0.44453	-0.01554	0.273913
Marital status	0.046638	0.007418	0.063143	-0.0169	-0.96545	-0.00243	-0.12574
Educational level	0.005866	-0.33072	0.817287	-0.17653	-0.09494	-0.05244	0.029572
Secondary occupation	0.004633	0.014851	0.120459	0.088685	-0.18377	0.008356	-0.01564
Household size	-0.00262	0.070165	-0.09647	0.150599	0.496301	0.020243	0.079318
Experience (rice)	0.005348	-0.25979	0.487928	-0.14391	0.261467	0.01992	-0.11958
Extension contact	0.172066	-0.12153	1.495466	-0.38212	0.668933	-0.01855	-0.11053
Mixed cropping	-0.05731	-0.00295	-0.04027	-0.00871	1.9741	-0.00016	0.087789
Length of participation in MKT11	-0.01435	-0.00498	-0.59836	0.01151	-0.14877	-0.00413	0.085338
Length of adoption of UDP	-0.00491	0.024246	-0.30452	-0.00073	-0.01316	-0.00295	0.027194
% of farm under UDP	0.000392	0.054286	0.420527	0.05701	0.410229	0.003752	0.005939
TLU	0.004686	-	-	0.13055	-0.52799	-0.00435	0.004104
CI	-	0.000579	-0.13531	-0.00201	-0.9626	-	-
Rice farm size	0.014661	-0.02423	-0.32111	-0.12052	-0.05609	-0.00483	0.002684
Dead-stock (₦)	0.018389	4741.05	-39210.3	-	-	548.7793	-2730.28
Endowment effect			4740.465		-0.3837		548.7262
Discrimination effect			-39206.2		-0.69843		-2729.93
Overall effect			43946.62		-1.08213		3278.66
% from overall effect		10.78687	-89.2131	35.45818	64.54182	16.73629	-83.2637
Gap			-0.57804		-62282		
Contribution to Gap		-0.06235	0.515687	-22084.1	-40197.9	0.000489	-0.00243
Without Discrimination		1.381441	1.381441	78295.07	78295.07	0.703955	0.703955
% of Disc. In asset			59.56515		105.514		0.34468

Source: Field survey, 2018

4. CONCLUSION AND RECOMMENDATIONS

Based on the findings, it can be inferred that gender differential has both effect and impact on the economic capital acquisition of women folk. Furthermore, in isolating the impact, the empirical evidence showed that the differential-gap in the economic capital asset acquisition between the two groups owes majorly to a structural difference called gender discrimination. Thus, gender inequality in access and control to productive resources and gender stereotype have succeeded in inducing gender discrimination affecting women folk access to economic capital asset accumulation. Gender mainstreaming and equality are now more important than ever to empower women with equal access to and control over productive resources, services, technology, credit, and information in order to increase agricultural production.Therefore, onus lies on the stakeholders- international, national and local institutions to strive toward effecting gender equality and equity, a precursor for growth and development for a virile society *viz.* gender budget mainstreaming. Furthermore, all stakeholders should be made aware of gender issues so that they can participate in the development of gender-sensitive policies, projects, and programs. Thus, it becomes imperative to narrow the gender gap inorder to enhance economic growth and development in the studied area in particular and the country in general. Generally, most of these interventions need legislative support and changes in agricultural policies. Others will depend on intra-household relationships which are less amenable to government intervention *viz.* targeted support tilted towards women producers could play an important role.

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