

## **Effect of Microcredit on Farm Productivity Among Cooperative Farmers in Ilaro Agricultural Zone, Ogun State, Nigeria**

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### **Abstract**

*The need for microcredit is more acute in the agriculture sector as it affects farm productivity and income in Nigeria. This study examined the effect of microcredit on farm productivity with focus on members of Farmers' association/ cooperators in the study area. A multi-stage sampling technique was used to obtain primary data from 193 respondents using structured questionnaire. Descriptive statistics, Binary Logit model and Cobb-Douglas production function were employed in data analyses. The results revealed that proportion of credit accessed from formal sources was 34.7% and informal sources (65.3%). The beneficiaries of formal loan were male (79.8%), about 88.0% were  $\leq 50$  year-old with, least, primary education (71.5%), average farming experience (15.13 years) and farm size of 2.36 hectares. Cooperative/ association was the main source providing 48.7% of the borrowed credit followed by informal sources (36.3%) and micro-finance institutions/ credit agencies (15.0%). Formal education ( $p < 0.01$ ), savings/ subscription ( $p < 0.01$ ), farm income ( $p < 0.01$ ) and farming experience ( $p < 0.01$ ) were the significant factors determining access to formal credit while primary occupation in non-farm activities ( $p < 0.05$ ) and farm size ( $p < 0.01$ ) negatively affected access to credit possibly due to smallholding. About 42.1% of the credit obtained was used for farming purpose, children education (15.9%), home consumption (12.4%), savings (12.1%), asset acquisition (9.9%) and social function (7.6%). However, seed, amount of credit and farming experience significantly increased productivity at  $p < 0.01$ ,  $p < 0.05$  and  $p < 0.10$  respectively while agrochemical had a negative effect. Therefore, the proportion of credit granted to farmers by credit institutions should be increased to enhance farm expansion and productivity. The farmers should participate and subscribe more into Farmers' association/ cooperative in order to have quick access to adequate credit at affordable interest rate. Loan utilization should be supervised to ensure prudent utilization for farming purposes.*

**Key words:** Microcredit, Productivity, Farm income, Farmers' association, Logit model.

**Introduction:** Microcredit is a veritable tool for poverty reduction and rural development and its delivery to the poor rural households serves as an antidote for solving production problems in the agriculture sector. The credit has a positive effect on farm income and it enables farmers to contribute significantly to their children's education and improve the welfare of the households (Ajayi, 2016). Access to credit is a powerful tool to promote productivity among the smallholder farmers and break the vicious cycle of poverty thereby improving the standard of living by translating sustainable income sources to better livelihood outcomes as this is fundamental to economic and social development of a nation (Khatiwada, Deng, Paudel, Khatiwada, Zhang and Su, 2017). It has been observed that about 41.6% of the rural population is financially excluded. Meanwhile, financial inclusive services should be used to increase the access of rural

households to funds or microcredit so that they can adopt welfare enhancing innovations (Abraham, 2018). By this approach, increased purchasing power will lead to improved welfare outcomes where the shocks for basic needs are relatively low (Ikudayisi, Babatunde and Yusuf, 2019).

According to Odunjo, Osawe and Okoruwa (2018), there was higher poverty incidence ( $P_0 = 0.4876$ ) among non-borrowers of microcredit compared to the borrowers ( $P_0 = 0.4419$ ). Similarly, Sun, Li and Li (2020) claimed that farm household vulnerability to poverty with credit was significantly lower (0.4%) than farm households without credit. Thus, the effect of credit on reducing vulnerability to poverty is greater. More so, Oyebanjo, Idowu, Fadipe and Sebiomo (2021) reported that education and amount of credit obtained significantly reduced the likelihood of being poor as well as depth and severity of poverty among farmers.

This implies that lack of robust credit scheme would exert negative influence on poverty profile of the farm households.

In spite of the role of agricultural credit, there is a limited access to the credit which is necessary to promote increased farm productivity and income in the rural sector of Nigeria (Assogba, Kokoye, Yegbemey, Djenontin, Tassou, Pardoe and Yabi, 2017). The major source among the farm households was informal credit and only 46.0% of the loan requested was disbursed resulting to 47.0% rise in farm income while 62.0% of the farm households were poor (Nwibo, Okonkwo, Eze, Mbam and Odoh, 2019). Though, Alemu, Tefera and Tasewu (2018) identified fear of risk of default, interest rate, transaction cost, repayment policy, compulsory savings and group lending approach as the main factors affecting the willingness to access microcredit from the formal credit institutions. Meanwhile, Adeoye and Ugalahi (2017) found that education level, farm size, extension visits and distance to loan office significantly determined access to loan scheme. In the same vein, Michael, Giroh, Polycarp and Ashindo (2018) claimed that lack of acceptable collateral/security; high interest rates, low financial literacy, and complex banking procedures were the main factors limiting respondents' access to credit facility from the formal sources.

Luqman, Xu, Yu, Yaseen and Gao. (2016) observed that majority of microcredit recipients were young at an average age of 36 years and they were female (78.0%) with low monthly income (US\$ 119) and low educational status compared to men. Despite these socioeconomic characteristics, the average loan size received by the respondents was increasing every year with significant impact on their livelihoods. Vishwanatha and Mutamuliza (2017) revealed the main reasons of the farmers for participating in microcredit programmes including payment of children's tuition fees, payment for health services, starting of off-farm businesses as a mean of diversification and augmentation of food consumption. It was concluded that increased efforts must be made in programmes and policies to improve access of farmers to adequate agricultural loan in order to promote farm productivity and livelihood of the rural households. Otherwise, fluctuating income level will be persistent towards poor standard of living (Okello, Hutchinson, Mwang'ombe, Ambuko, Olubayo and Mwakangalu, 2015). Therefore, the specific objectives of the study were to; Describe the socioeconomic characteristics of the farmers and their farming systems, Examine the determinants of access to

microcredit among the respondents, Evaluate the utilization of credit obtained by the farmers in the study area, and Estimate the effect of microcredit on farm productivity.

**Materials and Methods:** The study was conducted in Ogun State in the Southwest Geo-political zone of Nigeria. Ogun State lies within the latitude of 60°N and 80°N and longitude of 2.50°E and 50°E. It has a land mass of about 1.7 million hectares and estimated human population of 6,379,500 which is about 2.5% of the Nigerian population (NPC, 2022). There are four Agricultural zones designated by Ogun State Agricultural Development Programme (OGADEP) namely: Ijebu, Ikenne, Abeokuta, and Ilaro Agricultural zones. The two main types of vegetation are tropical rain forest and guinea savannah with average rainfall between 1500mm and 1800mm which last from March/April to October/November. The dry season lasts from October/November till March/April. Therefore, the weather conditions favour predominant production of crops and livestock in the study area.

A multi-stage sampling technique was used to obtain primary data from crop farmers in Ilaro Agricultural zone through structured questionnaire. The farmers were purposively selected from registered Cooperative groups and Farmers association. In the first stage, fifty percent i.e. two (2) Agricultural blocks namely: Imeko and Sawonjo were selected among the four (4) blocks that constituted the Ilaro Agricultural zone. The second stage involved the selection of a total of 15 cells or farming communities from the two Agricultural blocks while 13 to 15 Cooperative farmers were randomly selected in each cell. Subsequently, data from one hundred and ninety three (193) complete questionnaires were analysed for interpretation in this study.

**Analytical Techniques:** The socioeconomic characteristics of the respondents, their farming system and sources of credit were described using statistical tools such as frequency, percentage and mean. Following Michael *et al.* (2018), the Binary logit model was used to examine the factors affecting access to microcredit among the beneficiaries of formal credit in registered cooperatives/ Farmers' associations, microfinance bank and government credit agencies. The logit model has been used over times to examine bivariate dependent variables. It is a technique which

allows for estimating the probability that an event occur or not, by predicting a binary dependent outcome from a set of independent variables. The applications of the Logit model had been evident in previous studies (Bassey, Edet and Okeke, 2015; Oyebanjo, Amokaye, Akerele, and Dada, 2023). The logistic model adopted in this study postulates that the probability ( $P_i$ ) that a

farmer accessed microcredit is a function of an index ( $Z_i$ ) while  $Z_i$  is also the inverse of the standard logistic cumulative function of  $P_i$ . The dependent variable of the model is  $Y$  where  $Y=1$  if the farmers accessed formal credit in the last one year and 0, if otherwise within the same period. This is specified as follow;

$$P_i(Y=1) = F(Z_i)$$

$$Z_i = F^{-1}(P_i)$$

The index ( $Z_i$ ) denotes a set of explanatory variables ( $X$ 's) which is expressed implicitly in a linear function as;

$$Z_i = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n + \varepsilon$$

Explicitly, the estimating Logistic regression model is given as;

$$L_i = \ln \left[ \frac{P_i}{1 - P_i} \right] = Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{10} X_{10} + \varepsilon$$

Where,

$L$  = Probability that a farmer accessed microcredit from registered organisation (1, if accessed; 0 otherwise)

The explanatory variables in the model are;

$X_1$  = Age of the respondents (years),

$X_2$  = Sex of the respondents (1, if male, 0 otherwise),

$X_3$  = Marital status (1, if married, 0 otherwise),

$X_4$  = Formal education (years),

$X_5$  = Savings with microfinance institution/ cooperative (₦),

$X_6$  = Household size (number),

$X_7$  = farm income per annum (₦),

$X_8$  = Main occupation (1 = farming; 0 otherwise),

$X_9$  = Farm size (hectare)

$X_{10}$  = Farming experience (years).

Furthermore, the linear and double-log forms of the Cobb-Douglas production model were adapted to capture the effect of microcredit on farm productivity among other explanatory variables. The farm production functions were specified as;

Linear:  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \dots + \beta_9 X_9 + \mu$

Double-log:  $\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \dots + \beta_9 \ln X_9 + \mu$

Where:

$Y$  = Quantity of farm output divided by farm size (kg/ ha),

$X_1$  = Seed cultivated (kg/ha),

$X_2$  = Labour used (man-day/ha),

$X_3$  = Amount of loan/ credit obtained (₦),

$X_4$  = Level of formal education (years),

$X_5$  = Farming experience (years),

$X_6$  = Fertiliser applied on farm (kg/ha).

X<sub>7</sub> = Agrochemical used on farm (litre/ha).

X<sub>8</sub> = Age of farmer (years),

X<sub>9</sub> = Marital status (1, if male and 0, otherwise),

**Results and Discussion: The socioeconomic and farm characteristics of the respondents:**

The characteristics of the respondents were described under formal and informal sources of credit as presented in Table 1. The results revealed that 34.7% of the respondents had access to credit from formal sources such as registered cooperatives, microfinance bank and government credit agency while 65.3% obtained credit from informal sources including personal savings, local contribution group and friend/relation. Majority of the farmers (79.8%) were male while 20.2% of them were female. This indicates that male probably had access to production resources in farming than female. About 88.0% of the farmers were within the age of 50 year-old while 12.0% was above 50 years of age. This implies that most of the farmers were youth and they were agile to embark on productive and profitable agricultural activities. More so, 80.3% of them were married while 19.7% were single or once married. Meanwhile, the status of being single or once married could be associated with the problem of lack of guarantor who can promote access to formal credit and repayment. Majority (71.5%) of them had a minimum of primary education while only 28.5% were illiterate. The ability to read and write could promote credit acquisition from a formal source among farmers. In addition, education and skills help the rural people to pursue opportunities in agricultural innovations and new technologies that are vital for enhancing farm productivity. However, 80.8% of the farmers had an

average of 5 persons in their households. Perhaps, a large family size could restrict access of farmers to institutional loan. Though, a large household could have significant contribution to farm productivity through family labour supply but they consume large quantity of farm output thereby reducing the marketable stock for loan repayment.

About 62.2% of them had been farming for up to 30 years, 37.8% had a maximum of 10 years of experience while the average farming experience was 15 years. The number of year spent in farming implies the practical knowledge of the farm settings and how to overcome some challenges. Indeed, experience promotes skill acquisition which is fundamental to productivity and efficiency. The results further show that 10.9% of the farmers cultivated less than 2.0 hectares, 87.8% of them cultivated up to 3.0 hectares or more while the farm size cultivated by an average farmer was 2.36 hectares. This indicates that the respondents were small-scale farmers and this could be attributed low level of finance and inadequate production incentives for expansion of farm size. About 82.4% of them practiced mixed cropping system probably to diversify the sources of income so as to avert the risk and uncertainty in farm production while 17.6% embarked on sole cropping probably due to the use of high level of modern farm technologies such as tractor, herbicide and fertilizer, which are usually adopted in sole cropping system.

**Table 1: Characteristics of the respondents and their source of credits**

Variable	Formal source		Informal source		All respondents		Mean
	Freq.	%	Freq.	%	Freq.	%	
Sex of farmer							
Male	55	82.1	99	78.6	154	79.8	
Female	12	17.9	27	21.4	39	20.2	
Age of farmer (year)							
≤ 30	8	11.9	13	10.3	24	12.4	
31-40	30	44.8	59	46.8	86	44.6	
41-50	21	31.3	39	31.0	60	31.0	43.70
51-60	3	4.5	5	4.0	8	4.2	
> 60	5	7.5	10	7.9	15	7.8	

Marital status						
Single	7	10.5	17	13.5	24	12.4
Married	56	83.6	99	78.6	155	80.3
Divorced/ widow (er)	4	5.9	10	7.9	14	7.3
Education (year)						
No formal education	14	20.9	41	32.5	55	28.5
Primary education	27	40.3	36	28.6	63	32.6
Secondary education	22	32.8	42	33.3	64	33.2
Tertiary	4	6.0	7	5.56	11	5.7
Household size						
1 – 3	19	28.4	61	48.4	80	41.4
4 – 6	35	52.2	41	40.5	76	39.4
7 – 9	13	19.4	24	19.1	37	19.2
Farm experience (year)						
1 – 10	26	38.8	47	37.3	73	37.8
11 – 20	32	47.8	62	49.2	94	48.7
21 – 30	4	5.9	11	8.7	15	7.8
> 30	5	7.5	6	4.8	11	5.7
Farm Size (ha)						
1.0 - < 2.0	8	12.0	13	10.3	21	10.9
2.0 - < 3.0	38	56.7	71	56.4	109	56.5
≥ 3.0	21	31.3	42	33.3	63	32.6
Cropping system						
Sole cropping	11	16.4	23	18.3	34	17.6
Mixed cropping	56	83.6	103	81.7	159	82.4
Farm income (₦)						
≤ 100,000	4	6.0	8	6.4	12	6.2
100,000 - < 300,000	36	53.7	62	49.2	98	50.8
300,000 - < 500,000	21	31.3	42	33.3	63	32.6
≥ 500,000	6	9.0	14	11.1	20	10.4
Total	67	100	126	100	193	100

Source: Survey data, 2022

### The major sources of finance available to the farmers:

The formal and informal sources of finance available to the farmers are presented in Table 2. The results show that the bulk (48.7%) of the microcredit was obtained from cooperative/ farmers' associations by 111 respondents while 15.0% of the fund was accessed both from Micro-finance banks and government credit agencies by 30 farmers. This shows that the credit accessed from micro-finance institutions and government credit agencies is low probably due to

exorbitant interest rate, unaffordable collateral and cumbersome procedure. This could have a serious implication for farm investment and sufficient food production in the area. The informal sources available to the farmers comprised of local contribution group (13.9%), personal savings (10.0%), produce merchants/ money lenders (6.5%) and friend/ relation (5.9%). Thus, the total proportion of credit volume disbursed by all informal sources was 36.3% which is also considered to be low compared to cooperative associations.

**Table 2: Distribution of farmers by source of finance (n = 193)**

Source	Number of farmer	Minimum	Maximum	Mean	% of mean
Personal savings	126	7,500.00	230,000.00	113,333.52	10.0

Local contribution group	52	10,000.00	300,000.00	157,500.00	13.9
Friends/ relations	20	36,000.00	120,000.00	66,875.14	5.9
Cooperative/Farmers' association	111	20,000.00	900,000.00	553,269.23	48.7
Micro-finance bank/ Credit agency	30	50,000.00	700,000.00	170,983.61	15.0
Produce merchants/ money lenders	23	27,000.00	165,000.00	74,416.76	6.5
Total				1,136,378.26	100.0

Source: Survey data, 2022

**Factors affecting access to formal credit by the farmers:**

The Binary logit model was used to estimate the factors affecting access to microcredit among beneficiaries who obtained credit or loan from registered cooperative/ association, microfinance bank or government credit agency in the last one year. The results presented in Table 3 shows that the Chi-square value (103.3937) is significant at  $p < 0.01$  thereby indicating a good fit of the model to the data. The coefficient of formal education (0.3682) had a significant influence ( $p < 0.01$ ) on access to credit probably, This could be attributed to the positive effect of education in decision making to apply for credit, utilize it effectively as well as ensure timely repayment of the credit or loan. The amount of savings with the institution agency or cooperative had a positive and significant relationship (2.3850) with access to credit at ( $p < 0.01$ ). This could be considered as collateral for the credit to be taken. Hence, the farmer with higher savings/ subscription has a higher likelihood to gain access to credit in the formal organizations. Thus, an

increase in savings/ subscription by ₦1.00 would promote access to additional credit of ₦2.40.

Farm income (1.9340) significantly enhanced access to credit at  $p < 0.01$ . The coefficient possibly reflected loan repayment capacity of the farmer. Main occupation (-6.7384) had a significant negative influence on credit access at  $p < 0.05$ . This could be attributed to engagement in non-farm livelihood sources than farming activities. Meanwhile, agricultural loan is targeted at people who engage in farming as major occupation. The coefficient of farm size (-5.6175) is also negative thereby reducing access to credit at  $p < 0.01$  significant level. This could be due to small farm-holding as indicated by the average farm size in the area. However, farming experience (0.4813) significantly increased the access to formal credit at  $p < 0.01$ . Perhaps, a farmer with a long year of farming experience could understand the procedure for loan acquisition better as well as credit utilization for farm expansion purpose.

**Table 3: Logit model estimates of factors affecting access to formal credit (n = 193)**

Variables	Coefficient	Standard Error	t-ratio
Constant	-3.2367***	1.0614	-3.049
Age of the respondents	0.0118	0.1226	0.097
Sex of the respondents	1.3195	4.0799	0.323
Marital status	-21.0762	15.9974	-1.317
Formal education	0.3682***	0.1184	3.109
Savings with microfinance/ cooperative	2.3850***	0.8262	2.887
Household size	-0.6426	0.3830	-1.678
Farm income	1.9340***	0.5835	3.307
Main occupation	-6.7384**	2.6502	-2.543
Farm size	-5.6175***	1.6218	-3.464
Farming experience	0.4813***	0.1752	2.747
Log likelihood function	-35.4968		
Chi-Squared	103.3937***		

Source: Survey data, 2022. \*\*\*Significant at  $p < 0.01$  and \*\*Significant at  $p < 0.05$

**Credit utilization by the farming households:**

The pattern of credit utilization among the farmers was presented in Table 4. The results revealed that credit obtained was used for different purposes possibly to achieve the goals of the farm households. Farming attracted the highest proportion (42.1%) of the credit among the beneficiaries. This is followed by education

of children (15.9%) in form of payment of school fees. This implies that farming is the first priority while children education is also taken as important for family development in spite of the low income status of the farming households. About 12.4% of the credit was used to augment home consumption which ranked 3<sup>rd</sup> in the use of credit. This reason could be attributed to the

problem of food insecurity or poverty which needs to be solved among the rural households. The credit beneficiaries also ensured savings/ subscription to cooperative (12.1%) and asset acquisition (9.9%) as their 4<sup>th</sup> and 5<sup>th</sup> priorities respectively. Though, these

could promote investment and welfare of the farm households as well as guaranteed the repayment of borrowed fund. The least priority of the farmers is family/social function on which 7.6% of the credit obtained was expended.

**Table 4: Pattern of credit utilisation among the respondents (n = 193)**

Variables	Minimum	Maximum	Mean	% of mean	Rank
Farming purpose	125,000.00	650,000.00	357,682.93	42.1	1 <sup>st</sup>
Asset acquisition	10,000.00	97,000.00	83,854.17	9.9	5 <sup>th</sup>
Home consumption	10,000.00	240,000.00	105,770.83	12.4	3 <sup>rd</sup>
Children's education	35,000.00	200,000.00	134,893.62	15.9	2 <sup>nd</sup>
Family / social functions	50,000.00	80,000.00	65,000.00	7.6	6 <sup>th</sup>
Savings/ subscription	65,000.00	150,000.00	102,500.00	12.1	4 <sup>th</sup>
Total amount of credit used			849,701.55	100.00	

Source: Survey data, 2022

**Effect of micro-credit on farm productivity:** The effect of microcredit on productivity was also investigated among borrowers who accessed credit from formal or registered organization within the last one year. The regression estimates are presented in Table 5. The results show that F-value of the production model (29.911) is significant at  $p < 0.01$ . This means that the model has a goodness of fit to the data. The Double-log function was selected for interpretation based on higher adjusted- $R^2$  of 0.660 and number of significant independent variables. The value of adjusted- $R^2$  implies that the variables in the model accounted for 66.0% of variation in productivity among the farmers while exogenous variables which were not defined in the model e.g. climatic and soil conditions were probably responsible for the remaining variation of 34.0%.

The result shows that seed coefficient (0.703) has positive and significant effect on farm productivity

at  $p < 0.01$  probably due to the use of improved varieties of seed. Amount of credit (0.109) obtained by the borrowers also had significant positive effect on productivity at  $p < 0.05$  implying the amount of credit disbursed to the farmers had a positive effect. Hence, disbursement of adequate credit to the farmers would promote a greater level of farm productivity. More so, both formal education (0.094) and year of farming experience (0.130) had direct and significant effect on productivity of the farms at  $p < 0.10$ . This could be attributed to the knowledge, skills and practical understanding of the farmers which enhanced farm productivity in the area. Meanwhile, agrochemical had a negative coefficient (-0.152) meaning that the use of agrochemical had a significant reduction effect on productivity among the respondents at  $p < 0.01$ . Perhaps, there was misuse or overutilization of the chemicals possibly among the farmers with low education or farming experience.

**Table 5: Effect of microcredit and production factors on farm productivity (n = 67)**

Variable	Linear		Double-log	
	Coefficient	T -ratio	Coefficient	T -ratio
(Constant)	-8.487	-0.723	0.305***	3.111
Quantity of seed	0.1445	1.388	0.703***	7.815
Quantity of labour	0.106	1.220	-0.018	-0.361
Amount of credit obtained	0.401***	4.203	0.109**	2.107
Formal education	0.407***	4.907	0.094*	1.744
Farming experience	0.183	1.556	0.130*	1.875
Fertilizer applied	-0.093	-0.997	-0.043	-0.873
Agrochemical used	0.025	0.224	-0.152***	-2.919
Age of farmer	0.042	0.339	-0.009	-0.127
Marital status	0.060	0.714	-0.073	-1.424
R-square value	0.572		0.683	
Adjusted R-square	0.535		0.660	
F-statistics	9.992***		29.911***	

Source: Survey data, 2022.

\*\*\*Significant  $p < 0.01$  \*\*Significant  $p < 0.05$ , \*Significant  $p < 0.10$

**Conclusion and Recommendations:** The findings of the study revealed that 34.7% of the respondents accessed formal credit in spite of their participation in registered farmers' association and cooperative societies. The proportion of credit from both micro-finance institutions and credit agencies was low (15.0%) while 48.7% of the loan was obtained from cooperatives and 36.3% from informal sources. Primary engagement in non-farm activities had inverse relationship to credit access. However, amount of credit significantly enhanced farm productivity among other production inputs while the effect of agrochemical was negative (-0.152) possibly due to overutilization. The farmers used 42.1% of the credit obtained for farming purposes, 22.0% was either saved or invested on asset

acquisition, 15.9% was spent on children education, 12.4% was used to augment home consumption while the least 7.6% was spent on social functions. On the basis of the findings, there is a need to improve the internal management of microfinance institutions and credit agencies to increase the proportion of credit granted to farmers based on farm size as well as provide the services timely and more effectively. Farmers should increase their financial participation in registered association and cooperative since it was the main source of credit in the rural area. Loan utilization should be supervised in order to increase the proportion of the credit or loan used for farm expansion. Extension services should be intensified to educate the farmers on



application of modern inputs particularly agrochemicals which was misused.

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