Financial Inclusion, Gender Gaps and Agricultural Productivity in Mali

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Financial Inclusion, Gender Gaps and Agricultural Productivity in Mali

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List of abbreviations and acronyms

CGAP	Consultative Group to Assist the Poor
EAs	Enumeration Areas
EAC-I	Enquête Agricole de Conjoncture Intégrée aux Conditions de Vie des Ménages (Conjunctural Agricultural Survey Integrated with Living Conditions)
EAP	East Asia and Pacific
FAO	Food and Agriculture Organization
FCFA	Franc of the Financial Community of Africa
FI	Financial Inclusion
FPCCs	Fragile and Post-Conflict Countries
FSPs	Financial Service Providers
GDP	Gross domestic product
GSMA	Global System for Mobile Communications Association
INSTAT	Institut National de la Statistique
LSMS–ISA	Living Standards Measurement Study – Integrated Surveys on Agriculture
MFIs	Microfinance Institutions
MNOs	Mobile Network Operators
SA	South Asia
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme
UNSGSA	United Nations Secretary-General's Special Advocate for Inclusive Finance for Development

Abstract

Sub-Saharan African countries have recorded slow rates of economic growth when compared to other regions, and poverty has only reduced marginally. Amongst the group of sub-Saharan African countries, fragile and post-conflict countries (FPCCs) have performed particularly poorly in various indicators of development. Improvements in agricultural productivity have been identified as important avenues for attaining sustainable development in FPCCs. Financial inclusion and gender equality have the potential to be critical drivers of such improvements in agricultural productivity. This study conducted an empirical investigation of the effects of financial inclusion and gender gaps on agricultural productivity in Mali. The study made use of data from the Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS–ISA) for the year 2017 in Mali. The empirical results showed that, financial inclusion has had a positive and significant effect on agricultural productivity in Mali. In addition, the results showed that gender gaps exist in agricultural productivity, and agricultural productivity of women is lower than that of men. The study concludes by providing some policy options for improving financial inclusion and reducing gender gaps, so as to boost agricultural productivity.

Key words: *Agriculture; Productivity; Financial inclusion; Gender; Mali*

JEL classification codes: *J16, O13, Q12, C21, G20*

1. Introduction

Sub-Saharan African (SSA) countries have recorded slow rates of economic growth when compared to other regions. Between 1961 and 2017, average gross domestic product (GDP) per capita growth rate in SSA was 0.7%, while South Asia (SA) and East Asia and Pacific (EAP) recorded average growth rates of 3.1% and 3.7%, respectively. SSA's average growth was lower than the world average of 1.9% over this period.

Other indicators of development have not fared better, as SSA countries have performed poorly in indicators of poverty. The percentage of people that are poor in SSA has only reduced marginally, from 49% in 1981 to 41.1% in 2015. Conversely, the proportion of poor people in EAP fell from 80.8% in 1981 to 2.3% in 2015. For SA, it fell from 55.6% in 1981 to 12.4% in 2015. For all regions of the world, the poverty headcount fell from 42.2% in 1981 to 10% in 2015. In addition, the number of poor people in SSA increased from 194.2 million in 1981 to 413.3 million in 2015. SSA was the only region where the number of poor people in 2015 was higher than the number in 1981.

The prevailing conditions in SSA countries have limited their ability to achieve the sustainable development goals (SDGs). A key contributory factor to SSA's dismal economic performance has been the high incidence of fragile and post-conflict countries (FPCCs) in the region. Amongst the group of SSA countries, FPCCs have performed particularly poorly in attaining the SDGs. FPCCs are caught in the fragility trap of low growth and poor governance which are brought about by political instability and violence, insecure property rights, and corruption (Andrimihaja et al., 2011). Getting out of this fragility trap requires countries to initiate policies that will put them on the path to sustainable development.

One mechanism that has been identified for attaining sustainable development is financial inclusion. Financial inclusion (FI) can be said to be the proportion of individuals and firms that use financial services (Global Financial Development Report, 2014: 15). With inclusive financial systems, a high proportion of the population will use financial services, and this affords both households and firms the opportunities for external finance which contributes to reducing income inequality and achieving faster economic growth (Global Financial Development Report, 2014; 15). Financial inclusion has been shown to have a direct relationship with five of the SDGs: SDG 1 (ending poverty), SDG 2 (reducing hunger and promoting food security), SDG 3 (good

health and wellbeing), SDG 5 (gender equality), SDG 8 (decent work and economic growth) (Klapper et al., 2016; Truby, 2019; Collins et al., 2019; Kuada, 2019; United Nations Secretary-General's Special Advocate for Inclusive Finance for Development [UNSGSA] et al., 2018).

Another mechanism identified for achieving sustainable development is improvements in agricultural productivity. Agriculture is the main source of livelihood in SSA, employing over 70% of the work force (Backiny-Yetna & McGee, 2015). About 75% of the extreme poor in SSA are in rural areas, with over 90% of these involved in agriculture (Kilic et al., 2015). While a large proportion of agriculture in SSA is of the smallholder type, productivity is very low. Thus, smallholder agricultural productivity growth has been identified as a key driver of poverty reduction and increased food security in SSA (Kilic et al., 2015; Backiny-Yetna & McGee, 2015; Food and Agriculture Organization [FAO], 2009).

Gender gaps exist in both financial inclusion and agricultural productivity. About 56% of all unbanked adults globally are women (Demirgüç-Kunt et al., 2018). For SSA, in 2017, while 48% of males had an account, only 37% of females had an account (Demirgüç-Kunt et al., 2018). Fewer women have accounts in financial institutions than men, as women face high incidences of gender discrimination in accessing financial institutions. Agricultural productivity is lower for female farmers when compared to their male counterparts in SSA (Aguilar et al., 2015). Studies have found a gap in agricultural productivity to the disadvantage of women (Aguilar et al., 2015). Female farmers are less likely to own land and other assets, use financial services, or receive education and extension advice (Kasa et al., 2015).

What can be deduced from the foregoing is that improvements in agricultural productivity can play an important role in poverty reduction and enhancing economic growth and sustainable development in SSA. Financial inclusion and gender equality have the potential to be critical drivers of such improvements in agricultural productivity. Consequently, this study conducts an empirical investigation of the relationship between financial inclusion, gender gaps, and agricultural productivity in FPCCs in SSA, with particular focus on Mali.

This study makes three contributions to existing research. First, the study makes use of household data to derive measures of financial inclusion. The use of household data will improve on studies that have relied on country-level proxies for financial development, and crucially, the individual-level nature of the data which is from the perspective of users of financial services allows us to disaggregate financial inclusion by key respondent characteristics. It would be particularly interesting to examine financial inclusion in conflict areas. Second, this study quantitatively examines gender gaps in Mali. Household data is used to examine the conditions and characteristics of female-managed agricultural plots in Mali. This affords the opportunity of identifying ways in which gender gaps can be addressed in Mali. Third, this study empirically investigates the determinants of agricultural productivity in Mali. With majority of the population involved in agriculture, insights can be obtained on factors that can improve agricultural productivity, and hence welfare of households.

2. Background on Mali

Conflict in Mali

Since independence, Mali has endured various periods of armed conflict, with a variety of peace accords. It has been noted that the peace accords have largely been ineffective (Pezard & Shurkin, 2015; Chauzal & van Damme, 2015). Four rebellions have been recorded in the country: 1960–1964, 1990–1996, 2006–2009, 2012–2015 (Pezard & Shurkin, 2015). These rebellions have been waged by the Tuaregs who occupy the north of the country against the government domiciled in the south. The rebellions have resulted from decades of deep-rooted mutual distrust and historic tensions between northern and southern ethnic groups, which were exacerbated by French colonial rule (Hegazi et al., 2021; Chauzal & van Damme, 2015). These grievances include the fact that the southerners who are largely in government have overlooked socioeconomic development in the north (Chauzal & van Damme, 2015). In addition, the north has largely not had representation in government. The northern rebellions that have arisen out of these grievances have led to withdrawal of the government from the north, thereby further deepening distrust and tensions (Chauzal & van Damme, 2015). In recent times, the absence of formal government in the north has created ample opportunities for the emergence and operation of terrorist groups in the country.

A unique attribute of the fourth rebellion has been that, while it started in the north with armed attacks by the Tuaregs, the conflict has spread to central Mali, with active participation by other groups. Since 2015, there has been a surge in communal violence in central Mali, leading to increased insecurity (Hegazi et al., 2021). Conflicts between pastoralists and farmers over resources have escalated to armed confrontations. This has fuelled banditry and extremism; while the little or no government presence has led to the proliferation of self-defence militias (Hegazi et al., 2021).

State of gender equality in Mali

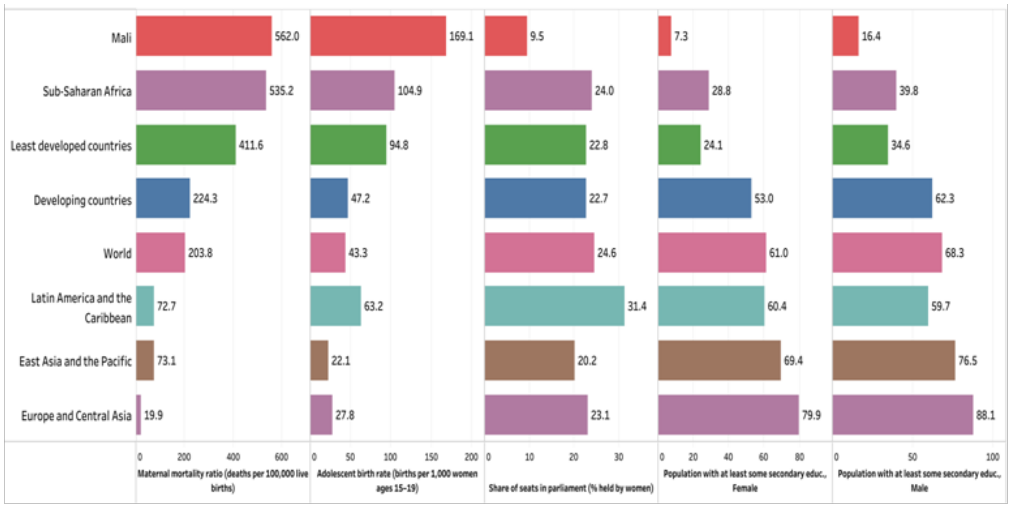
Negative gender gaps are prevalent in Mali. In the gender inequality index of the human development report for 2020, Mali had a value of 0.671 and ranked 158 out of 162 countries (United Nations Development Programme [UNDP], 2020). In the global gender gap index for 2021, Mali had a score of 0.591 and ranked 149 out of 156 countries (World Economic Forum, 2021). Iceland was the highest ranked country with a score of 0.892; implying that, while in Iceland, 89.2% of the gender gap has been closed, only 59.1% of the gender gap has been closed in Mali.

Figure 1 presents the gender inequality index for Mali and regional averages. Maternal mortality is very high in Mali, with 562 deaths per 100,000 live births. The figures for SSA are also very high, with 535.2 deaths per 100,000 live births. The adolescent birth rate in Mali is very high, with girls aged 15-19 accounting for 169 births per 1,000 births.

Women have low participation in government in Mali, as only 9.5% of the seats in parliament are held by women (Figure 1). In comparison, the SSA average is 24%, while it is as high as 31.4% in Latin America and the Caribbean. In the global gender gap report, Mali had a score of 0.172 in political empowerment, implying that only 17.2% of the gender gap in political empowerment has been closed. Thus, women have a very low voice in government in Mali. The gender inequality in Mali is further illustrated by comparing the education of boys with girls. Figure 1 shows that, in Mali, 7.3% of adult female have some level of secondary education, but 16.4% of adult male have some level of secondary education. Thus, the number of males with some level of secondary education is double the number of females. This clearly shows gender inequality in education.

The low literacy and education of girls in Mali have implications for work and income. From the global gender gap report, Mali had a score of 0.475 and ranked 141 for Economic Participation and Opportunity. Thus, Mali has been able to close less than 50% of its gender gap in economic opportunities. Labour force participation for women is 60% while it is 82.8% for men. In addition, estimated income for men is $3,700 while it is $1,000 for women, meaning that men earn almost four times as much as women. Only 22.3% of female workers are in the professional and technical category while 77.8% of male workers are in this category (World Economic Forum, 2021). Some of the reasons for the high gender gaps in this category include: underrepresentation in the labour market, lack of women in senior and managerial positions, income gaps/ wage gaps, and high volume of unpaid work.

Figure 1: Human development index 2020: Gender inequality index



Source: Human Development Report 2020.

Financial inclusion in Mali

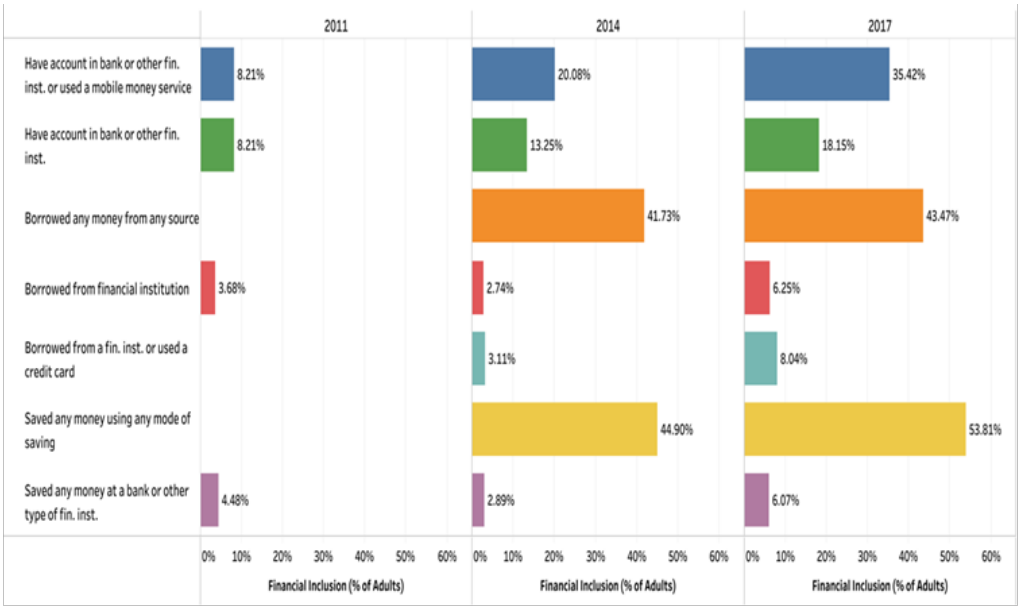
The Malian financial system is populated by three operators: banks, microfinance institutions (MFIs) and mobile network operators (MNOs). However, deposits in the financial system are dominated by deposit money banks, as they accounted for 95% of total financial sector assets in 2017 (Beck et al., 2019). Traditionally, the banks have had the majority of financial assets and catered to large firms, while MFIs with very low assets have catered to small firms and households. MFIs generally had wider reach and so were able to focus on customers at a more micro level. However, several MFIs collapsed in 2009 resulting in the loss of deposits of thousands of low-income customers, leading to loss of confidence in the financial system (World Bank, 2019). In recent times, MNOs have emerged to offer easily accessible digital financial services and have been able to provide even wider reach than MFIs.

Figure 2 shows financial inclusion in Mali. The first bar presents data on the first of the three major dimensions of financial inclusion: account ownership (Demirgüç-Kunt & Klapper, 2013). The figure shows that financial inclusion increased from 8.21% in 2011 to 20.08% in 2014 and increased further to 35.42% in 2017. However, the second bar shows that most of the increases in financial inclusion have been as a result of mobile money. In 2014, while 20.08% of adults had accounts in financial institutions including mobile money services, when the mobile money component is removed, financial inclusion drops to only 13.25%. Also, for 2017, when the mobile money services component of financial inclusion is removed, financial inclusion drops to 18.15%. Thus, mobile money services accounted for 34% of financial inclusion in 2014 and 48.7% in 2017, and these figures clearly show the important role that MNOs have been playing in enhancing financial inclusion in Mali.

The third to fifth bars of Figure 2 present statistics on the second major dimension of financial inclusion: borrowing. About 41.7% of people borrowed in 2014 while this number increased to 43.4% in 2017. However, most of the borrowing is outside the financial system. The fourth bar shows that only 2.74% of people borrowed from a financial institution in 2014 while this number increased slightly to 6.25% in 2017. Thus, while many Malians borrow, they do so outside the formal financial system. The 6th and 7th bars of the figure present data on the third major indicator of financial inclusion: savings. The figure shows that similar to the observations for borrowing, many people save, but very few save in financial institutions. In 2014, 44.9% of people saved and this had increased to 53.8% in 2017. However, only 2.8% of people saved in financial institutions in 2014, while this number was 6% in 2017.

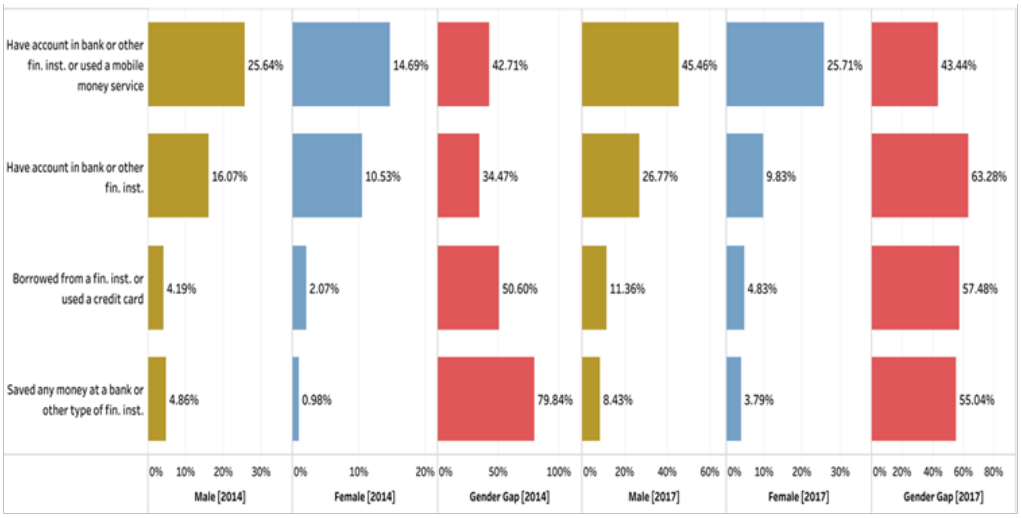
Gender gaps in financial inclusion are prevalent in Mali. Figure 3 presents financial inclusion in Mali disaggregated by gender, and it shows that gender gaps in financial inclusion don't just exist, but increased between 2014 and 2017. In 2014, 25.64% of men and 14.69% of women had accounts in a financial institution or used a mobile money service. This implies a gender gap of 42.71%. The gender gap in this category increased to 43.44% in 2017. The gender gap for people having accounts in financial institutions excluding mobile money services is higher, as the gender gap increased from 34.47% in 2014 to 63.28% in 2017. Thus, fewer women have accounts in financial institutions in 2017 than in 2014. This indicates a clear movement of women from patronising financial institutions to mobile money services. These reflect the high incidences of gender discrimination that women face in accessing financial institutions in Mali, and the attendant easing of those discriminations with mobile money (MicroSave Consulting, 2020). The gender gap persists in borrowing from financial institutions. In 2014, 4.19% of men and 2.07% of women had borrowed from financial institutions, giving a gender gap of 50.5%. The gender gap in borrowing increased to 57.48% in 2017, as 11.36% of men and 4.83% of women borrowed from financial institutions. For savings, the gender gap fell from 79.84% in 2014 to 55.04% in 2017.

Figure 2: Financial inclusion in Mali – Broad indicators



Source: Demirgüç-Kunt et al. (2018).

Figure 3: Financial inclusion in Mali (2014, 2017) – Gender gap



Source: Demirgüç-Kunt et al. (2018).

3. Data

This study makes use of data from the Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) of the World Bank. These are household surveys conducted by the LSMS team at the World Bank in conjunction with domestic statistical agencies in eight SSA countries: Burkina Faso, Ethiopia, Malawi, Mali, Niger, Nigeria, Tanzania, and Uganda. The LSMS-ISA has the objective of promoting innovation and better research on the links between agriculture and poverty reduction in SSA.

In Mali, the surveys are called the Enquête Agricole de Conjoncture Intégrée aux Conditions de Vie des Ménages (EAC-I) [Agricultural Survey Integrated with Living Conditions]. The surveys are implemented by the Cellule de la Planification et de la Statistique du Secteur Développment Rural (CPS/SDR) of the Ministry of Agriculture, in collaboration with the Institut National de la Statistique (INSTAT). The LSMS team was responsible for the management and technical design of the project, as well as for the provision of technical assistance and the support of analytical work resulting from the collected data.

The goal of the survey is to collect data on households, their characteristics, and their welfare with a particular focus on agricultural activities. These surveys have been conducted twice in Mali, 2014–2015 and 2017–2018, thereby giving rise to two datasets: EAC-I 2014 and EAC-I 2017 (Ministry of Rural Development Planification and Statistics Unit of Mali, 2019). The EAC-I follows the methodology of the LSMS and is representative at the national, zonal, and rural/urban levels. The EAC-I is carried out in two visits: post-planting and post-harvest. The same households visited in the first visit were revisited in the second. The visits were planned to match the timing of the post-planting and post-harvest periods (Ministry of Rural Development Planification and Statistics Unit of Mali, 2019). The first visit was made after the planting season (between August and October). The second visit was made after the harvest season (between December and February).

This study focuses on the EAC-I 2017. This is largely because of two reasons. First, although the same enumeration areas (EAs) visited in 2014 were visited in 2017, for logistical reasons, it was not possible to track households between the two editions (Ministry of Rural Development Planification and Statistics Unit of Mali, 2019). Thus, the two data sets for EAC-I 2014 and EAC-I 2017 cannot be used as a panel data set. Second, the EAC-I in 2017 is the latest data source and will provide the most up-to-date information on agricultural households in Mali.

The final sample for the EAC-I 2017 comprises 8,390 households (Ministry of Rural Development Planification and Statistics Unit of Mali, 2019). Three questionnaires are administered in the EAC-I: household, agriculture, and community. The household questionnaire contains information of a general nature, arranged in 18 sections, such as demographic characteristics, education, health, shocks, remittances, savings and credits, and food consumption. The agriculture questionnaire contains information in 15 sections, such as farm structure, cost of inputs, equipment, production and sales, labour, and subventions. The community questionnaire contains information that is common for the households in the selected community, and contains information such as social services and community needs.

4. Model specification

This study examines the relationship between financial inclusion, gender gaps, and agricultural productivity of households in Mali. This involves conceptualizing agricultural productivity as a production function with inputs such as financial inclusion, sex of the plot manager, other characteristics of the manager, types of input, and characteristics of the plot. Estimations are then conducted to estimate the effects of financial inclusion and gender on agricultural productivity.

In order to examine the effects of financial inclusion and gender differences on agricultural productivity, we estimated the following broad model:

$$AGRIPOD_i = \beta_1 + \beta_2 FINCL_i + \beta_3 GEND_i + \beta_4 Z_i + \varepsilon \quad (1)$$

$AGRIPOD_i$ = agricultural productivity
$FINCL_i$ = financial inclusion
$GEND_i$ = dummy variable for gender
Z_i = vector of other inputs affecting agricultural productivity

A regression containing both male- and female-managed plots is first estimated (Equation 1). A dummy variable for gender (GEND) which has the value of 1 for female-managed plots and 0 for male-managed plots is included in this estimation. However, such an estimation might not account for potential endogeneity from differential allocation of plots and crops to male and female members of the household (Campos et al., 2016). Thus, following other authors (Campos et al., 2016; Oseni et al., 2015; Kilic et al., 2015; Aguilar et al., 2015; Slavchevska, 2015; Karamba & Winters, 2015), estimations are then conducted separately for male and female plot managers. These are Equation 2 and Equation 3 (for men and female managers only, respectively).

$$AGRIPOD_{iM} = \beta_M + \beta_{2M} FINCL_{iM} + \beta_{3M} Z_{iM} + \varepsilon \quad (2)$$

$$AGRIPOD_{iF} = \beta_F + \beta_{2F} FINCL_{iF} + \beta_{3F} Z_{iF} + \varepsilon \quad (3)$$

In order to account for heterogeneities in areas such as culture, society, the economy, region-specific fixed-effects are included in all estimations. Such heterogeneities that exist in Mali have effects on access to land for men and women, types of crops grown, and these ultimately affect agricultural productivity.

Financial inclusion is the first primary explanatory variable of interest in this specification. In line with the three classifications of the Global Findex Database, we capture financial inclusion using the three dimensions of access, borrowing, and savings (Demirgüç-Kunt & Klapper, 2013).

The first measure is financial access, which provides information on households who have a bank account. The EAC-I captures a variety of questions on account ownership. Respondents are asked if they own an account in any financial institution, including a classic/traditional bank, MFI, MNO, and postal service. Subsequently, they are asked separately if they own accounts in a traditional bank, postal service, rural saving bank/MFI, and MNO. Thus, financial access is captured through five different channels.

The second measure of financial inclusion is borrowing or credit. This measure provides information on households who have borrowed money either from formal or semi-formal financial institutions. The EAC-I asks if respondents have obtained credit in the past 12 months; the value of the last loan obtained; if the credit obtained was in cash; and if the credit obtained was in kind. Thus, borrowing or credit is captured through four different channels.

The third measure of financial inclusion is saving, which captures saving in financial institutions. Respondents are asked if they have savings in their accounts. This provided one channel for savings.

Gender differential is the second primary explanatory variable. One of the key advantages of the LSMS-ISA, and by extension the EAC-I, is that managers of individual agriculture plots are identified in the survey. When such managers are linked with the socioeconomic and demographic characteristics, it is possible to identify the managers of plots by their gender, age, education, and other characteristics. Following other studies (Oseni et al., 2015; Kilic et al., 2015; Aguilar et al., 2015; Slavchevska, 2015; Karamba & Winters, 2015) we categorize managers of plots by gender in order to differentiate plots managed by male and female. Thus, we do not simply rely on using the information about the household head to determine gender, thereby guarding against problems associated with using the household head to estimate gender differences in agricultural productivity. One of such problems is that the household head does not necessarily make decisions in agriculture on land ownership or cropping (Campos et al., 2016). Also, using the gender of the household head may conceal gender differences in productivity, as some other members of the household could be responsible for day-to-day decision-making on the plot other than the household head (Oseni et al., 2015). In our estimations, we first estimate using a dummy variable to represent gender of the plot manager. Thereafter, we estimate separate regressions for male and female plot managers.

For the dependent variable, following other studies (Oseni et al., 2015; Kilic et al., 2015; Aguilar et al., 2015; Slavchevska, 2015; Karamba & Winters, 2015), agricultural productivity (AGRIPOD) is measured as the monetary value of gross output per hectare. The gross value of output per hectare is obtained by adding the values of all crops harvested on the plot, and dividing this sum by the area of the plot.[1]

5. Estimation results

Summary statistics

The summary statistics are presented in Table 1. This table contains summary statistics for all plot managers, male plot managers, and female plot managers. In order to highlight gender differences, the last column reports the difference (and t-test) between male and female plot managers. The total number of households in the survey was 8,390, out of which 6,288 were agricultural households. Of the agricultural households, complete data on agricultural productivity was available for 6,062 households. After removing outliers and plots below 100 square metres, we were left with 8,361 plot managers, with 5,952 male plot managers and 2,409 female plot managers.

Table 1 shows that, agricultural productivity of male plot managers is, on average, higher than female managers. Male plot managers have significantly higher agricultural productivity than female plot managers. The average value of harvest per hectare of female managers is 62% lower than that of male managers. This provides an early indication of gender gaps in agricultural productivity.

Male plot managers are, on average, older than female managers. In addition, male managers are more educated than female managers and more likely to be single. Female plot managers are involved in more polygamous marriages, and also more likely to be divorced or widowed. Financial inclusion is higher for male managers than female managers, indicating gender gaps in financial inclusion. More male managers have requested for credit from financial institutions, and have obtained more loans than female managers.

Female plots are smaller in size and are farther from homes. However, female plots are of slightly higher quality. Interestingly, there is just a slight difference between the number of male and female self-owned plots. Female plots have less access to all types of labour, whether family or hired labour. Female managers use significantly less agricultural inputs such as organic or inorganic manure. Also, elements of gender bias in access to information exist, as male managers disproportionately have more information on input subsidies. Male managers have actually received more vouchers for seeds and fertilizers. The table shows that the crops predominantly planted by male managers are millet, sorghum, maize, and black-eyed peas; while crops such as peanut, okra, and green sorrel are more favoured by women.

Table 1: Summary statistics and results from tests for mean differences by gender of the plot manager

	All Plot Managers	Male Plot Managers	Female Plot Managers	Difference
Agricultural productivity				
Harvest value (FCFA '000)	110,354.40	130,276.82	12,687.15	117,589.67***
Harvest value per ha (FCFA '000)	92,090.194	107,124.21	39,927.18	67,197.023***
Manager characteristics				
Manager age	47.158	50.726	38.040	12.687***
Married monogamous	0.592	0.66	0.472	0.188***
Married polygamous	0.356	0.306	0.425	-0.119***
Divorced/separated/widowed	0.035	0.013	0.088	-0.075***
Single	0.016	0.02	0.014	0.007
Religion (=1 if non-Muslim)	0.034	0.048	0.014	0.033***
Non-farm work	0.034	0.049	0.021	0.029***
Household female adult size (age 15-64)	3.479	3.075	4.305	-1.23***
Household male adult size (age 15-64)	3.082	2.919	3.542	-0.623***
Child dependency ratio	1.201	1.184	1.207	-0.024
Manager w/no education (=1 if yes)	0.884	0.856	0.928	-0.073***
Manager completed primary education (=1 if yes)	0.011	0.016	0.006	0.01***
Manager compl. junior sec. education (=1 if yes)	0.006	0.01	0.002	0.008***
Manager years of schooling	0.908	1.16	0.495	0.666***
Manager financial inclusion				
Has an account in a bank or microfinance institution (=1 if yes)	0.06	0.093	0.007	0.086***
Have any savings at home? (=1 if yes)	0.357	0.412	0.233	0.18***
Requested credit in the past 12 months? (=1 if yes)	0.094	0.152	0.044	0.108***
Benefited from a credit in the past that was not fully reimbursed? (=1 if yes)	0.118	0.17	0.051	0.118***
Number of loans not yet reimbursed	1.582	1.546	1.230	0.315
Nominal amount of the loan for the last loan (FCFA)	8,594,555.6	8,388,512.2	4,531,789	3,856,723.3
Last credit obtained (cash)	0.489	0.442	0.859	-0.416***
Last credit obtained (kind)	0.563	0.605	0.209	0.397***
Account held in a classic bank (=1 if yes)	0.509	0.551	0.489	0.062
Account owned in account and postal checks (=1 if yes)	0.183	0.165	0.399	-0.234

continued next page

Table 1 Continued

	All Plot Managers	Male Plot Managers	Female Plot Managers	Difference
Manager financial inclusion				
Account held in the MFI Rural Savings Bank (=1 if yes)	0.479	0.48	0.399	0.081
Account owned in other form of Mobile Banking (=1 if yes)	0.325	0.303	0.910	-0.607***
Have savings in their accounts? (=1 if yes)	0.639	0.61	0.489	0.121
Obtained credit in the past 12 months? (=1 if yes)	0.928	0.935	0.987	-0.052**
Benefited from a credit in the past that was not fully reimbursed? (=1 if yes)	0.118	0.17	0.051	0.118***
Plot characteristics				
Area (GPS, ha)	4.871	6.592	0.713	5.879***
Plot distance to home (minutes)	25.333	25.466	25.647	-0.181
Soil: sandy (=1 if yes)	0.527	0.477	0.494	-0.017
Soil: clay (=1 if yes)	0.406	0.442	0.430	0.012
Soil: latentic/red (=1 if yes)	0.063	0.074	0.073	-0.001
Soil: other (=1 if yes)	0.004	0.007	0.003	0.005
Soil quality: good (=1 if yes)	0.372	0.377	0.397	-0.02
Soil quality: fair (=1 if yes)	0.604	0.596	0.587	0.009
Soil quality: bad (=1 if yes)	0.024	0.027	0.016	0.01**
Built facilities to fight Erosion (=1 if yes)	0.054	0.067	0.047	0.02
Own plot (=1 if yes)	0.955	0.95	0.932	0.018
Labour				
Family labour				
Used family labour (=1 if yes)	1	1	1	0
Male family labour number/size	6.278	8.348	1.634	6.714***
Male family labour days/worked	25.698	33.599	4.591	29.008***
Female family labour number/size	4.717	5.558	2.715	2.843***
Female family labour days/worked	17.769	19.769	11.586	8.183***
Child family labour number/size	6.159	7.755	2.231	5.523***
Child family labour days/worked	21.142	26.274	5.744	20.53***
Hired labour				
Used hired labour (=1 if yes)	0.18	0.205	0.089	0.116***
Hired male labour number/size	1.337	1.795	0.200	1.594***
Hired male labour days/worked	1.691	1.996	0.273	1.723***
Hired female labour number/size	0.36	0.432	0.096	0.335***
Hired female labour days/worked	0.811	1.121	0.138	0.983**

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Table 1 Continued

	All Plot Managers	Male Plot Managers	Female Plot Managers	Difference
Hired labour				
Hired child labour number/size	0.138	0.168	0.035	0.133***
Hired child labour days/worked	0.077	0.076	0.016	0.06***
Agricultural inputs				
Amount/quantity organic manure	3,219.514	4,538.92	881.678	3,657.242***
Amount of Urea used	425.065	420.506	13.599	406.907**
Amount of DAP used	278.177	268.807	12.632	256.175
Amount of NPK used	284.344	288.124	11.594	276.53
Amount of pesticides used	2.555	3.819	0.372	3.447***
Amount of fungicides used	40.97	63.182	0.127	63.055
Amount of herbicides used	9.392	15.344	1.017	14.328***
Input subsidies				
Know that the government grants input subsidies to farmers	0.684	0.71	0.384	0.325***
Does not know that the government grants input subsidies to farmers	0.316	0.29	0.616	-0.325***
Selected for hybrid seed corn subsidies this campaign?	0.054	0.056	0.0	0.056***
Actually received coupons for the purchase of hybrid corn seeds this season?	0.433	0.331	0.0	-0.331
How much quantity of hybrid corn seeds have you obtained vouchers? (kg)	1.918	1.648	0.0	1.648**
Used up the entire amount received in hybrid corn seed coupons?	1	1	0	1
Quantity (kg) of hybrid maize seeds actually used?	0	0	0	0
Have you been selected to benefit from the fertilizer subsidies?	0.32	0.357	0.302	0.055
Has actually benefited from vouchers for the purchase of fertilizers during this current campaign?	0.837	0.825	0.448	0.377*
How much quantity of fertilizer did you obtain vouchers? (kg)	77.786	122.414	0.177	122.237***
Used all the quantity received in fertilizer vouchers?	0.925	0.937	1	-0.063***
Quantity of fertilizer did you actually use? (kg)	0.54	0.872	0	0.872

continued next page

Table 1 Continued

	All Plot Managers	Male Plot Managers	Female Plot Managers	Difference
Crop characteristics				
Millet	0.33321	0.476	0.027	0.449***
Sorghum	0.28454	0.371	0.045	0.326***
Rice	0.22509	0.263	0.207	0.055
Maize	0.29602	0.389	0.048	0.341***
Fonio	0.03552	0.052	0.010	0.042***
Sweet potato	0.00514	0.008	0.0	0.008***
Black-eyed peas	0.07762	0.098	0.063	0.035
Peanut	0.47435	0.317	0.751	-0.434***
Soya	0.00012	0.00016	0.0	0.00016
Sesame	0.03504	0.038	0.003	0.035***
Onion	0.00036	0.00057	0.00019	0.00038
Pepper	0.00191	0.003	0.0008	0.002
Carrot	0.00048	0.00117	0.0	0.00117
Okra	0.00012	0	0.0015	-0.0015
Lettuce	0.00036	0.0011	0.0	0.0011
Watermelon	0.0055	0.008	0.00027	0.008***
Green sorrel	0.00132	0.002	0.0013	0.001
Red sorrel guinea	0.00036	0	0.0018	-0.00183
Cabbages	0.00024	0.00072	0	0.00072
Beet	0.00036	0.00109	0.0	0.00109
Cotton	0.09628	0.159	0.008	0.151***
Dah /fiber	0.00012	0.00032	0.0	0.00032
No of observations	8361	5952	2409	

Notes: The t-test is a weighted unequal variances t-test. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design.

Base regressions: Isolating the effects of financial inclusion and gender on agricultural productivity

The first set of estimations show the effects of only gender and financial inclusion on agricultural productivity. Table 2 presents regressions for all plot managers where only the dummy variable for gender and different financial inclusion variables are included. The dummy variable for gender takes on a value of 1 for female plot managers and value of 0 for male managers. In column (1), the only explanatory variable is gender, and this is an example of what has been termed a naïve regression in the literature, because they control for only the dummy variable for gender (Kilic et al., 2015; Oseni et al., 2015).

Table 2: Effects of gender and financial inclusion on agricultural productivity in Mali (all plot managers)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Gender (=1 if female)	-0.701***										
	(.116)										
Has an account in a bank or microfinance institution? (=1 if yes)		-0.063									
		(0.172)									
Have savings in their accounts? (=1 if yes)			0.638*								
			(0.358)								
Obtained credit in the past 12 months? (=1 if yes)				-0.198							
				(0.369)							
Log [Nominal amount of the loan for the last loan: FCFA]					0.042						
					(0.037)						
Has an account in a classic bank? (=1 if yes)						0.085					
						(0.307)					
Account owned in account and postal checks? (=1 if yes)							0.402				
							(0.405)				
Account held in MFI rural savings bank? (=1 if yes)								0.407			
								(0.323)			
Account held in form of mobile banking (=1 if yes)									-0.044		
									(0.305)		

continued next page

Table 2 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Last credit obtained (=1 if cash)										-0.551**	
										(0.233)	
Last credit obtained (=1 if kind)											0.416*
											(0.239)
Observations	8361	2800	169	263	1188	169	169	169	169	1189	1189
R-squared	0.106	0.078	0.123	0.291	0.25	0.094	0.1	0.104	0.093	0.267	0.26

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

The result in column (1) indicates a very high gender gap of 70.1%. Referred to as the unconditional gender gap, this result is statistically significant, and implies a large difference between productivity of male and female farmers. This result indicates that significantly large differences exist in agricultural productivity between male and female farmers. This shows that being female poses significant disadvantages to plot managers. Thus, gender discrimination exists in agricultural productivity.

The results for financial inclusion are presented in columns (2) to (11), and show contrasting results for the different indicators of financial inclusion. Six of the indicators have positive coefficients (savings in their accounts, amount of the loan for the last loan, account in a classic bank, account in postal office, account held in MFI rural savings bank, last credit obtained in kind); while four indicators have negative coefficients (account in a bank or microfinance institution, credit in the past 12 months, account held in form of mobile banking, last credit obtained in cash). However, only three variables are statistically significant. The variables capturing savings in accounts and credit obtained in kind are significant positive, indicating that financial inclusion enhances agricultural productivity. The variable capturing credit obtained in cash is significantly negative. The negative coefficient obtained for this variable could be indicating a phenomenon that is quite common in SSA, that of using credit for uses other than it was obtained for. When credit is obtained in cash, this makes it readily available for spending for a variety of other purposes. This highlights the wide problem of moral hazard in financial markets.

The contrasting results for financial inclusion warrant some further exploration. Figure 4 presents the breakdown of respondents for financial inclusion questions; and the figure reveals that 2,631 respondents indicated they do not have an account at a bank or microfinance bank, while only 169 respondents had such accounts. This gives a financial inclusion rate of just 6.04%, and pales in comparison to the nationally reported figure of 35.42%. The large number of financially excluded managers explains why the variable measuring ownership of accounts, which is a dummy variable, is negative. Figure 4 reveals that four other variables had a higher number of respondents indicating financial exclusion: account owned in postal office, account held in the MFI rural savings bank, account owned in form of mobile banking, last credit obtained in cash. Four variables had a higher number of respondents who are financially included: account held in a classic bank, have savings in their accounts, obtained credit, and last credit obtained in kind.

Two important observations can be drawn. All four variables that had a higher number of respondents who are financially included had positive coefficients in the estimations. This is not surprising given that the financial inclusion variables are dummy variables. This highlights the first important observation to note: people need to be included in the financial system before this can positively affect their agricultural productivity. The second important observation is: the high variation in responses to the financial inclusion questions is responsible for the contrasting results obtained for how financial inclusion affects agricultural productivity.

Figure 5 presents the total number of responses to the financial inclusion questions. The highest number of responses was 2,800. This is just 33.5% of the total number of observations. Responses were as low as 169 (2% of the total number of observations) for many of the crucial questions related to ownership of accounts in the different types of financial institutions. For women, there were many instances of only five responses to these critical questions. This lack of valid data points critically inhibited meaningful statistical testing of the effects of financial inclusion on agricultural productivity.

Despite the low responses on financial inclusion, the data provides information on the reasons given for taking out loans. Figure 6 shows that, 60.47% of respondents obtained loans for the purpose of purchasing agricultural inputs. In addition, 8.66% of respondents obtained a loan for agricultural equipment. Thus, 69.13% of people who obtained loans did so for agricultural purposes. This is an incredible statistic, and further shows the important role that access to financial services can play in stimulating agricultural productivity in Mali.

In order to further examine gender differences, Table 3 and Table 4 present estimates of the effects of financial inclusion on agricultural productivity for men and women, respectively. For men, Table 3 shows that two financial inclusion variables—savings and account in post offices—have exerted a significant positive effect on agricultural productivity. The finding for savings confirms what was observed for the full sample, and indicates that savings are an important determinant of agricultural productivity in Mali. Interestingly, credit obtained in cash is significantly negative, confirming what was observed for the full sample, that is credit is used for other uses than what it was obtained for. Figure 5 shows that responses for women are critically low for most of the financial inclusion indicators. Because of this small number of responses for women, Table 4 only contains estimations for four financial inclusion variables. All variables are negative and statistically insignificant.

Table 3: Effects of financial inclusion on agricultural productivity in Mali (male plot managers)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Has an account in a bank or microfinance institution? (=1 if yes)	-.238									
	(.181)									
Have savings in their accounts? (=1 if yes)		.793**								
		(.352)								
Obtained credit in the past 12 months? (=1 if yes)			-.014							
			(.394)							
Log [Nominal amount of the loan for the last loan: FCFA]				.002						
				(.032)						
Has an account in a classic bank? (=1 if yes)					.221					
					(.308)					
Account owned in account and postal checks? (=1 if yes)						.66*				
						(.371)				
Account held in MFI rural savings bank? (=1 if yes)							.51			
							(.323)			
Account held in form of mobile banking (=1 if yes)								.007		
								(.281)		
Last credit obtained (=1 if cash)									-.309*	
									(.171)	
Last credit obtained (=1 if kind)										.177
										(.177)

continued next page

Table 3 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	9.823***	8.765***	9.56***	10.16***	9.197***	9.207***	9.285***	9.342***	10.474***	10.154***
	(.152)	(.409)	(.709)	(.471)	(.397)	(.359)	(.38)	(.38)	(.295)	(.256)
Observations	2042	164	251	1113	164	164	164	164	1114	1114
R-squared	.12	.148	.327	.279	.105	.121	.119	.102	.285	.281

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

Table 4: Effects of financial inclusion on agricultural productivity in Mali (female plot managers)

	(1)	(2)	(3)	(4)
Has an account in a bank or microfinance institution? (=1 if yes)	-.02			
	(.771)			
Log [Nominal amount of the loan for the last loan: FCFA]		.011		
		(.069)		
Last credit obtained (=1 if cash)			-.451	
			(.431)	
Last credit obtained (=1 if kind)				.16
				(.326)
Constant	10.032***	10.12***	10.687***	10.216***
	(.111)	(.972)	(.485)	(.344)
Observations	758	75	75	75
R-squared	.071	.321	.326	.322

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

Figure 4: Breakdown of respondents for financial inclusion

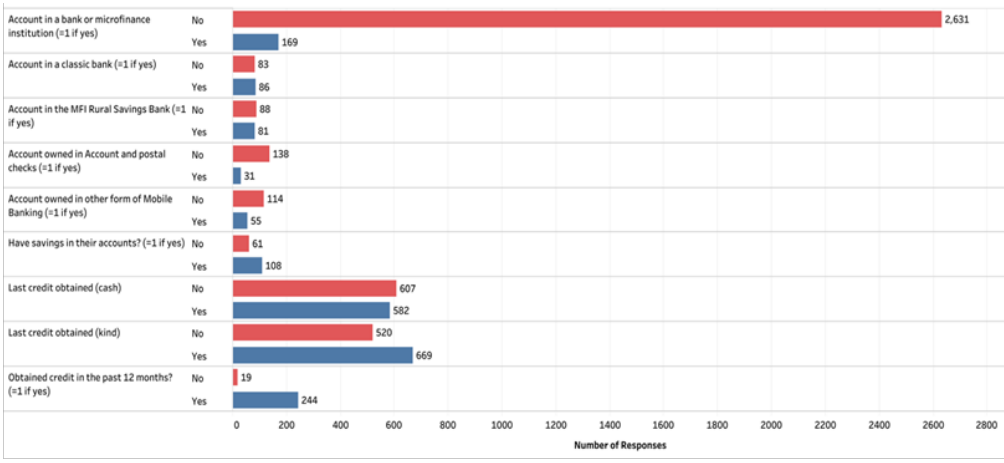


Figure 5: Number of responses for financial inclusion

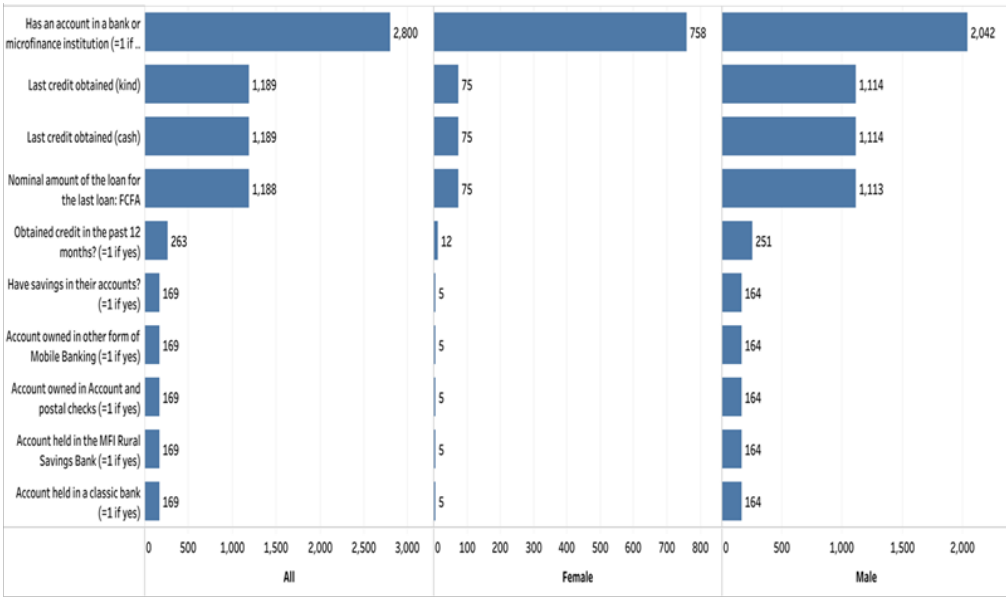
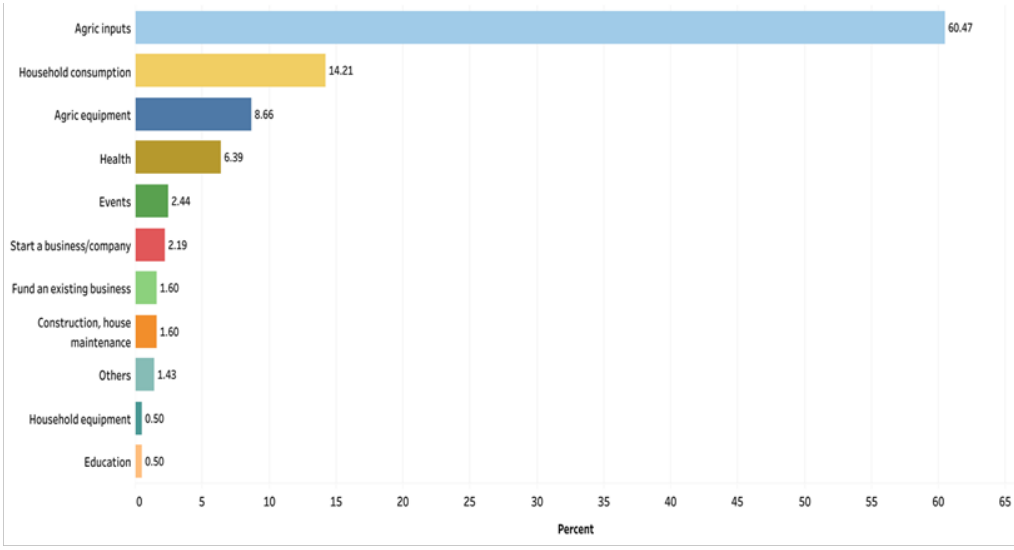


Figure 6: Reasons for taking out last loan



Full regressions: Effects of financial inclusion, gender and other variables on agricultural productivity

Having established that unconditional gender gaps in agricultural productivity exist, we move to estimate full regressions that include other determinants of agricultural productivity. Table 5 presents the estimation of the effects of financial inclusion, gender, and other variables on agricultural productivity for the full sample, that is, both male and female plot managers. In this case, the coefficients on the dummy variable for gender will provide estimates of conditional gender gaps. If the size and significance of the conditional gender gap changes, then this would indicate that the newly included variables are important factors in explaining the gender gap. Conversely, if the sign and significance of the gender gap are largely unchanged, then this would imply that gender gaps persist beyond these other variables.

Table 5: Effects of gender differences, financial inclusion and other variables on agricultural productivity (all plot managers)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Gender (=1 if female)	.04	.001	-.409	-.683	-.498**	-.527	-.658	-.545	-.499	-.445**	-.481**
	(.11)	(.134)	(1.172)	(.425)	(.216)	(1.005)	(1.053)	(1.008)	(.943)	(.218)	(.219)
Has an account in a bank or microfinance institution? (=1 if yes)		-.167									
		(.145)									
Have savings in their accounts? (=1 if yes)			.644*								
			(.345)								
Obtained credit in the past 12 months? (=1 if yes)				-.159							
				(.37)							
Log [Nominal amount of the loan for the last loan: FCFA]					-.021						
					(.03)						
Has an account in a classic bank? (=1 if yes)						.314					
						(.241)					
Account owned in account and postal checks? (=1 if yes)							.537				
							(.347)				
Account held in MFI rural savings bank? (=1 if yes)								.333			
								(.261)			
Account held in form of mobile banking (=1 if yes)									.105		
									(.238)		

continued next page

Table 5 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Last credit obtained (=1 if cash)										-.135	
										(.141)	
Last credit obtained (=1 if kind)											.018
											(.145)
Log (Manager age)	-.166**	-.298**	-.639	-.276	-.422**	-.824	-.683	-.719	-.738	-.408**	-.417**
	(.08)	(.132)	(.614)	(.465)	(.193)	(.67)	(.635)	(.644)	(.648)	(.195)	(.193)
Log (Manager years of schlg.)	-.051	-.035	.183	.058	-.121*	.135	.137	.202	.187	-.123*	-.125*
	(.036)	(.048)	(.131)	(.102)	(.065)	(.141)	(.144)	(.134)	(.141)	(.066)	(.065)
Log (Household female adult)	-.119*	-.065	-.341	-.038	-.065	-.484	-.361	-.411	-.432	-.074	-.067
	(0.66)	(.096)	(.352)	(.34)	(.163)	(.374)	(.365)	(.368)	(.37)	(.165)	(.165)
Log (Household male adult)	.111	.072	.143	.178	.147	.218	.113	.11	.149	.137	.134
	(.07)	(.107)	(.434)	(.363)	(.14)	(.47)	(.442)	(.459)	(.461)	(.142)	(.141)
Child dependency ratio	-.03	-.023	.091	-.157	-.032	.003	.002	-.011	.004	-.039	-.04
	(.035)	(.05)	(.22)	(.159)	(.07)	(.229)	(.22)	(.226)	(.228)	(.071)	(.071)
Log (Plot area in ha.)	.141*	.109	.294	.386*	.343***	.352	.309	.257	.33	.339***	.343***
	(.074)	(.091)	(.19)	(.199)	(.108)	(.213)	(.208)	(.235)	(.216)	(.107)	(.106)
Log (Plot distance to home)	.042***	.07	.088	-.107	.019	.05	.029	.036	.048	.015	.016
	(.015)	(.053)	(.218)	(.198)	(.03)	(.21)	(.215)	(.212)	(.213)	(.03)	(.03)
Log (Male family lab. days)	.107***	.096**	-.071	.112	.103*	-.1	-.099	-.073	-.07	.103*	.101*
	(.037)	(.043)	(.116)	(.116)	(.061)	(.12)	(.122)	(.116)	(.115)	(.061)	(.061)
Log (Female family labour)	.193***	.196***	.312***	.039	.155***	.335***	.362***	.341***	.326***	.15***	.153***
	(.023)	(.03)	(.118)	(.102)	(.056)	(.123)	(.127)	(.125)	(.124)	(.056)	(.057)

continued next page

Table 5 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Log (Child family lab. days)	.052**	.076***	.049	.072	-.014	.024	.014	.025	.022	-.013	-.01
	(.024)	(.029)	(.105)	(.084)	(.044)	(.108)	(.105)	(.106)	(.109)	(.044)	(.044)
Log (Male hired labour days)	.1***	.113**	.017	.248*	.132*	.094	.116	.116	.08	.127*	.124*
	(.038)	(.057)	(.141)	(.128)	(.072)	(.129)	(.132)	(.134)	(.131)	(.07)	(.07)
Log (Female hired labour)	.121	.206***	.196	.343**	.223***	.131	.111	.116	.156	.222***	.228***
	(.086)	(.078)	(.305)	(.166)	(.081)	(.268)	(.281)	(.274)	(.27)	(.082)	(.081)
Log (Child hired lab. days)	-.037	-.018	-.002	-.399	.061	-.1	-.148	-.101	-.128	-.04	-.025
	(.122)	(.145)	(.357)	(.313)	(.24)	(.336)	(.344)	(.337)	(.333)	(.219)	(.223)
Log (Qty. of org. manure)	.082***	.08***	.08**	.05	.045***	.071*	.07*	.07*	.075*	.042**	.042**
	(.01)	(.013)	(.039)	(.031)	(.017)	(.04)	(.039)	(.039)	(.04)	(.017)	(.017)
Log (Quantity of urea used)	.061***	.074***	-.052	.044	.044	-.039	-.035	-.042	-.034	.038	.04
	(.019)	(.021)	(.056)	(.06)	(.03)	(.055)	(.054)	(.054)	(.055)	(.031)	(.031)
Log (Quantity of pesticides)	.172***	.14*	.334*	.06	.085	.359*	.356*	.4**	.362*	.081	.09
	(.045)	(.074)	(.185)	(.168)	(.057)	(.192)	(.195)	(.193)	(.193)	(.055)	(.056)
Log (Quantity of fungicides)	.042	.033	.01	.203	.157***	-.018	-.04	-.028	-.014	.164***	.16***
	(.05)	(.085)	(.162)	(.181)	(.052)	(.182)	(.184)	(.182)	(.181)	(.051)	(.051)
Constant	9.635***	9.946***	10.56***	10.569***	11.438***	11.882***	11.505***	11.675***	11.599***	11.299***	11.203***
	(.306)	(.541)	(2.67)	(1.873)	(.802)	(2.803)	(2.708)	(2.733)	(2.757)	(.776)	(.777)
Observations	8353	2798	169	263	1188	169	169	169	169	1189	1189
R-squared	.257	.247	.3	.452	.41	.281	.285	.28	.275	.41	.409

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

The results in Table 5 show that the magnitude of the gender gap has reduced. While the size of the gender gap was estimated as 70.1% in Table 1, the gender gaps estimated in Table 5 range between 68.3% and 0%. However, only three out of 11 coefficients (columns 5, 10, 11) of the gender gap are statistically significant. Considering only the significant cases, the size of the gender gap has reduced and ranges between 44.5% and 49.8%.

The finding of a reduction in magnitude and significance of the gender gap in agricultural productivity when other control variables are included in estimations is similar to what other studies have found (Kilic et al., 2015; Aguilar et al., 2015; Slavcheska, 2015; Karamba & Winters, 2015). This has been explained by the fact that other factors of production are important in determining agricultural productivity (Campos et al., 2016). Thus, gender gaps can be attributed to unequal access to these factors of production between men and women.

The results for financial inclusion are similar to the results from Table 2. Savings has a positive coefficient and is the only financial inclusion variable that is statistically significant, albeit at the 10% level. The other indicators of financial inclusion are all insignificant and are either positive (account in a classic bank, account owned at the postal office, account in MFI rural savings bank, account in form of mobile banking, and last credit obtained [kind]); or negative (account in a bank or microfinance institution, credit in the past 12 months, amount of the last loan, last credit obtained [cash]). These conflicting and largely insignificant results for financial inclusion are reflective of our earlier observations about the nature of the data (a dummy variable) and the low number of respondents for financial inclusion.

For the other variables, the results show that younger farmers have higher agricultural productivity, although this does not apply to female farmers. Bigger plot sizes are significantly associated with higher productivity for the full sample, male and female farmers. Female workers, whether from the family or hired hands, are associated with higher productivity across all samples. Interestingly, hired child labour is associated with lower productivity. The use of agricultural inputs such as organic manure, pesticides and fungicides, all lead to higher agricultural productivity.

Table A1 and Table A2 (in the appendix) present separate estimations for the determinants of agricultural productivity for male and female managers, respectively. For men, a strong positive effect of financial inclusion on agricultural productivity is found (Table A1 in the appendix). For women, the estimations were conducted for three financial inclusion variables, showing positive coefficients for two variables and a negative coefficient for one variable. As previously discussed, these conflicting results for women's financial inclusion can be attributed to the very low number of female respondents for the financial inclusion variables.

Robustness tests: Estimations with an alternative dependent variable

Having established that gender gaps in agricultural productivity exist, and that financial inclusion is important for improving productivity, we move to examine whether the results are robust to the dependent variable used. Particularly for gender gaps, it is possible that the measure of productivity used, which accounts for output and prices, could simply be more favourable for men because men produce crops that command higher prices. We have addressed this by using an alternative measure of agricultural productivity: harvest quantity per hectare. This is calculated as quantity of output of each crop per hectare on each plot. Since this measure of productivity is devoid of prices, we are able to correct for the possibility that the previous measure of productivity variable favours men that produce crops with higher prices.

Table 6 presents the results of estimating the effects of only gender and financial inclusion on this alternative measure of agricultural productivity. The result is consistent with the result in Table 2, and women are still disadvantaged in agricultural productivity. The unconditional gender gap is 68%, which is just slightly lower than the previous gap of 70.1%. Thus, irrespective of the measure of agricultural productivity used, being female poses significant disadvantages to plot managers. This confirms our previous finding that gender discrimination exists in agricultural productivity in Mali.

Table 6: Effects of gender and financial inclusion on agricultural productivity in Mali (all plot managers) – Alternative dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Gender	-0.67***										
	(0.094)										
Has an account in a bank or microfinance institution? (=1 if yes)		0.036									
		(0.117)									
Have savings in their accounts? (=1 if yes)			0.271								
			(0.221)								
Obtained credit in the past 12 months? (=1 if yes)				-0.105							
				(0.319)							
Log [Nominal amount of the loan for the last loan: FCFA]					0.062***						
					(0.024)						
Has an account in a classic bank? (=1 if yes)						-0.028					
						(0.204)					
Account owned in account and postal checks? (=1 if yes)							-0.185				
							(0.24)				
Account held in MFI rural savings bank? (=1 if yes)								0.085			
								(0.208)			
Account held in form of mobile banking (=1 if yes)									-0.077		
									(0.229)		
Last credit obtained (=1 if cash)										-0.432***	
										(0.134)	

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Table 6 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Last credit obtained (=1 if kind)											0.358**
											(0.15)
Constant	7.269***	6.902***	6.434***	6.779***	6.514***	6.624***	6.641***	6.598***	6.655***	7.647***	7.169***
	(0.102)	(0.106)	(0.327)	(0.478)	(0.397)	(0.316)	(0.309)	(0.303)	(0.311)	(0.253)	(0.233)
Observations	8361	2800	169	263	1188	169	169	169	169	1189	1189
R-squared	0.151	0.103	0.167	0.139	0.148	0.155	0.159	0.156	0.156	.163	0.156

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

For the financial inclusion variables, there is strong evidence that access to and use of financial services promotes agricultural productivity. Most coefficients are positive and the coefficients for value of loans and loans obtained in kind are statistically significant. This is consistent with the result from Table 2. Also, as observed from Table 2, the variable capturing credit obtained in cash is significantly negative; again suggesting the use of credit obtained in cash for purposes other than it was obtained for.

Table 7 presents the results of including all the other determinants of agricultural productivity in the estimation. The results show that the gender gap in agricultural productivity persists. The dummy variable for gender is negative in 9 out of 11 columns. As previously observed in Table 2, the magnitude of the conditional gender gap has reduced, and the highest gap is now 46.2%. However, the gender gap is statistically significant in five estimations. Thus, even after using an alternative measure of agricultural productivity, gender gaps are still prevalent in Mali.

Table 7: Effects of gender differences, financial inclusion and other variables on agricultural productivity (all plot managers) – Alternative dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Gender (=1 if female)	-.292***	-.199*	.013	-.262	-.462***	.001	-.022	-.027	-.041	-.42***	-.439***
	(.091)	(.108)	(.742)	(.294)	(.147)	(.669)	(.686)	(.689)	(.68)	(.157)	(.157)
Has an account in a bank or microfinance institution? (=1 if yes)		-.132									
		(.112)									
Have savings in their accounts? (=1 if yes)			.207								
			(.194)								
Obtained credit in the past 12 months? (=1 if yes)				-.132							
				(.282)							
Log [Nominal amount of the loan for the last loan: FCFA]					.009						
					(.022)						
Has an account in a classic bank? (=1 if yes)						-.03					
						(.183)					
Account owned in account and postal checks? (=1 if yes)							.046				
							(.214)				
Account held in MFI rural savings bank? (=1 if yes)								.09			
								(.169)			
Account held in form of mobile banking (=1 if yes)									.111		
									(.165)		
Last credit obtained (=1 if cash)										-.195**	
										(.093)	

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Table 7 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Last credit obtained (=1 if kind)											.144
											(.108)
Log (Manager age)	-.083	-.092	-.237	-.247	-.251*	-.262	-.265	-.264	-.266	-.234*	-.245*
	(.057)	(.098)	(.344)	(.301)	(.13)	(.36)	(.341)	(.343)	(.341)	(.132)	(.132)
Log (Manager years of schlg.)	-.021	-.041	.039	-.05	-.039	.042	.034	.044	.046	-.039	-.04
	(.023)	(.036)	(.077)	(.083)	(.043)	(.088)	(.082)	(.079)	(.081)	(.042)	(.042)
Log (Household female adult)	-.032	.05	.344*	.315	.038	.319	.32	.32	.317	.017	.022
	(.057)	(.074)	(.193)	(.251)	(.113)	(.2)	(.208)	(.202)	(.199)	(.115)	(.115)
Log (Household male adult)	.112**	.058	-.301	.312	.189	-.306	-.302	-.31	-.3	.202	.199
	(.053)	(.085)	(.23)	(.275)	(.122)	(.246)	(.23)	(.236)	(.231)	(.123)	(.123)
Child dependency ratio	.012	.045	-.152	.002	.069	-.177	-.179	-.184	-.187	.066	.067
	(.032)	(.042)	(.194)	(.136)	(.062)	(.202)	(.205)	(.206)	(.206)	(.061)	(.062)
Log (Plot area in ha.)	-.2***	-.239***	.014	-.162	-.018	.02	.022	.006	.031	-.03	-.027
	(.048)	(.06)	(.129)	(.151)	(.083)	(.122)	(.129)	(.128)	(.129)	(.08)	(.08)
Log (Plot distance to home)	.023**	.022	-.051	-.122	.02	-.065	-.066	-.068	-.062	.018	.018
	(.011)	(.042)	(.162)	(.131)	(.024)	(.156)	(.159)	(.157)	(.157)	(.024)	(.024)
Log (Male family lab. days)	.14***	.171***	.062	.316***	.181***	.065	.06	.062	.063	.183***	.182***
	(.033)	(.037)	(.073)	(.087)	(.053)	(.073)	(.077)	(.074)	(.073)	(.052)	(.052)
Log (Female family labour)	.137***	.145***	.21***	-.079	.01	.214***	.218***	.219***	.215***	.008	.007
	(.018)	(.026)	(.069)	(.076)	(.047)	(.069)	(.068)	(.069)	(.069)	(.047)	(.047)
Log (Child family lab. days)	.031	.038	.073	-.069	-.049	.064	.063	.065	.066	-.048	-.046
	(.02)	(.023)	(.057)	(.051)	(.035)	(.054)	(.055)	(.055)	(.055)	(.034)	(.035)

continued next page

Table 7 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Log (Male hired labour days)	.081***	.084**	.013	.074	.038	.034	.038	.044	.029	.036	.036
	(.028)	(.038)	(.097)	(.098)	(.05)	(.093)	(.095)	(.095)	(.094)	(.049)	(.049)
Log (Female hired labour)	.074	.079	.08	.214*	.145**	.068	.062	.056	.07	.144**	.153**
	(.046)	(.058)	(.148)	(.114)	(.069)	(.158)	(.161)	(.165)	(.156)	(.065)	(.066)
Log (Child hired lab. days)	.061	.046	-.091	-.214	.185	-.131	-.131	-.124	-.138	.014	.014
	(.08)	(.117)	(.247)	(.306)	(.15)	(.235)	(.234)	(.237)	(.228)	(.167)	(.169)
Log (Qty. of org. manure)	.041***	.05***	.041*	.026	.006	.04	.039	.038	.04	.006	.006
	(.007)	(.01)	(.025)	(.026)	(.013)	(.025)	(.025)	(.025)	(.025)	(.013)	(.013)
Log (Quantity of urea used)	.142***	.164***	.092**	.201***	.155***	.097**	.097**	.095**	.099**	.15***	.151***
	(.011)	(.013)	(.044)	(.046)	(.023)	(.045)	(.044)	(.045)	(.045)	(.024)	(.024)
Log (Quantity of pesticides)	.112***	.111**	.201*	-.01	.004	.211*	.21*	.221*	.21*	-.009	-.005
	(.034)	(.049)	(.114)	(.09)	(.043)	(.114)	(.114)	(.117)	(.115)	(.041)	(.041)
Log (Quantity of fungicides)	.064**	.045	.026	.095	.051*	.021	.018	.015	.014	.058*	.057*
	(.032)	(.044)	(.08)	(.092)	(.03)	(.084)	(.086)	(.086)	(.086)	(.033)	(.032)
Constant	6.712***	6.512***	6.954***	6.961***	7.671***	7.299***	7.302***	7.313***	7.222***	7.914***	7.745***
	(.251)	(.405)	(1.489)	(1.326)	(.588)	(1.464)	(1.411)	(1.42)	(1.424)	(.521)	(.537)
Observations	8353	2798	169	263	1188	169	169	169	169	1189	1189
R-squared	.293	.304	.378	.407	.333	.373	.373	.374	.374	.334	.332

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

For financial inclusion, we still observe mixed results with six positive and four negative coefficients, albeit insignificant. However, Table A3 and Table A4 (in the appendix) present the results separated for male and female managers. Interestingly, we observe significant positive coefficients for a few financial inclusion variables. Thus, it can be concluded that irrespective of the measure of agricultural productivity employed, financial inclusion has had a positive effect on agricultural productivity in Mali.

6. Conclusion and policy options

This study conducted an empirical analysis of the relationship between financial inclusion, gender gaps, and agricultural productivity in Mali. While the economic performance in many SSA countries, and in FPCCs, has been poor, improvements in agricultural productivity have been recognized as an important avenue for improved economic outcomes. Financial inclusion and women advancement are two critical avenues identified for agricultural productivity increases.

Financial inclusion in Mali has increased in recent years, from 8.21% in 2011, to 20.08% in 2014, and to 35.42% in 2017. This has been largely attributed to the phenomenal growth recorded by MNOs. Despite these increases, financial inclusion in Mali lags behind many other African countries.

The empirical analysis made use of data from the Living Standards Measurement Study - Integrated Surveys on Agriculture (LSMS-ISA), Enquête Agricole de Conjoncture Intégrée aux Conditions de Vie des Ménages (EAC-I) for the year 2017 in Mali. With a financial inclusion rate of 6.04%, financial inclusion is very low for these agricultural households.

The empirical results showed that gender gaps exist in agricultural productivity in Mali. Agricultural productivity of women is lower than that of men. The unconditional specification revealed a gender gap of 70%, but the conditional gender gap fell to between 44.5% and 49.8% when other variables were included. Also, financial inclusion was found to have a positive and significant effect on agricultural productivity.

From the results, a number of policy options can be proffered. First, more agricultural households need to be included in the financial system. The results showed that savings in the financial system was consistently associated with improved agricultural productivity. Thus, there is a market for access to and use of financial services by agricultural households, irrespective of gender. Programmes need to be implemented to improve financial inclusion.

Second, 69.13% of loans obtained were for agricultural purposes. It is important that schemes that target agricultural activities be embarked upon. Such programmes should be considerate of the peculiarities of agricultural households, and should be flexible enough to attract, rather than discourage such households. Such considerations include provision of collateral or high interest rates.

Third, mobile money is critical for financial inclusion, especially for women. The gender gap in financial inclusion presents a critical challenge for Mali, and the migration of women from financial institutions to mobile money services presents

an interesting avenue for addressing this gender gap. It is important for the gender gap in financial inclusion to be addressed. The prevalence of gender gaps, and the disadvantages that women face in Mali, is reflected in poorer outcomes related to education, income, labour force participation, and participation in government. Improving the financial inclusion gender gap, particularly through mobile money, has the potential to help in achieving the SDGs, as mobile money supports 11 of the 17 SDGs (GSMA, 2017).

Fourth, there is the need to consider and address the gender norms that limit the ability of women to access use and benefit from financial services (Arnold et al., 2021; Koning et al., 2021). An understanding of these gender norms will help financial service providers (FSPs) in identifying why women are financial excluded, thereby formulating how best to intervene to increase women's financial inclusion and economic empowerment (Koning et al., 2021). With this knowledge, interventions can be put in place to increase financial inclusion of women. Such interventions can be organized into two: norm-informed and norm-transformative interventions (Koning et al., 2021). For norm-informed interventions, gender norms and their impact take central place, ensuring that efforts to influence changes in the market system account for the different needs and capabilities of women that result from these norms. For norm-transformative interventions, efforts are directed at changing norms to enable behaviour change that leads to increased women's financial inclusion and economic empowerment (Koning et al., 2021: 5).

Fifth, in order to improve agricultural productivity, agricultural policies need to target important variables that were found to boost productivity. Specifically, younger people need to be attracted and encouraged into agriculture. Also, more female workers were found to be associated with higher productivity. Thus, female workers also need to be attracted into agriculture. Furthermore, farmers need increased access to agricultural inputs such as organic manure, pesticides and fungicides, which were all found to lead to higher agricultural productivity. Finally, more land should be allocated to agriculture, as bigger plot sizes were found to be associated with higher productivity.

Notes

1. The value of output per hectare on each plot is calculated using the formula: $\{\sum_c (q_c p_c)\}/\mathrm{A}$; where, q is the output harvest of crop *c* in kilogrammes, *p* is the respective price of crop *c* per kilogram, and *A* is the plot area. Specifically, *p* is the median crop sales value per kilogram within the corresponding enumeration area (EA), on the condition that at least 10 observations are available. When fewer than 10 values are available, *p* is calculated as the median crop sales value at the next higher geographical level.

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Appendix

Table A1: Effects of financial inclusion and other variables on agricultural productivity (male plot managers)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Has an account in a bank or microfinance institution? (=1 if yes)	-.153									
	(.148)									
Have savings in their accounts? (=1 if yes)		.827**								
		(.336)								
Obtained credit in the past 12 months? (=1 if yes)			-.159							
			(.402)							
Log [Nominal amount of the loan for the last loan: FCFA]				-.017						
				(.033)						
Has an account in a classic bank? (=1 if yes)					.384					
					(.244)					
Account owned in account and postal checks? (=1 if yes)						.692**				
						(.339)				
Account held in MFI rural savings bank? (=1 if yes)							.434			
							(.271)			
Account held in form of mobile banking (=1 if yes)								.12		
								(.241)		
Last credit obtained (=1 if cash)									-.082	
									(.148)	

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Table A1 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Last credit obtained (=1 if kind)										-.027
										(.153)
Log (Manager age)	-.232	-.34	-.325	-.367*	-.63	-.44	-.497	-.545	-.36*	-.365*
	(.167)	(.621)	(.487)	(.216)	(.691)	(.652)	(.668)	(.674)	(.217)	(.215)
Log (Manager years of schlg.)	-.03	.184	.068	-.13*	.123	.122	.206	.186	-.131*	-.134**
	(.052)	(.133)	(.108)	(.067)	(.144)	(.148)	(.137)	(.143)	(.068)	(.067)
Log (Household female adult)	-.222*	-.304	.156	-.018	-.484	-.327	-.393	-.417	-.023	-.021
	(.116)	(.354)	(.327)	(.166)	(.379)	(.368)	(.371)	(.375)	(.167)	(.167)
Log (Household male adult)	.013	.031	-.15	.07	.146	.013	.011	.067	.062	.06
	(.126)	(.433)	(.388)	(.139)	(.481)	(.447)	(.472)	(.473)	(.14)	(.14)
Child dependency ratio	-.056	.147	-.261	-.044	.028	.027	.009	.027	-.052	-.052
	(.057)	(.22)	(.166)	(.071)	(.235)	(.223)	(.231)	(.232)	(.072)	(.071)
Log (Plot area in ha.)	.134	.246	.338	.322***	.328	.273	.205	.302	.321***	.322***
	(.092)	(.187)	(.222)	(.11)	(.212)	(.207)	(.239)	(.218)	(.109)	(.108)
Log (Plot distance to home)	.089	.063	-.109	.03	.02	-.013	0	.018	.028	.028
	(.06)	(.221)	(.199)	(.035)	(.213)	(.218)	(.214)	(.215)	(.035)	(.035)
Log (Male family lab. days)	.107**	.023	.132	.084	-.032	-.024	.003	-.001	.083	.082
	(.054)	(.121)	(.126)	(.063)	(.128)	(.131)	(.126)	(.125)	(.063)	(.063)
Log (Female family labour)	.168***	.222*	-.034	.147***	.268**	.296**	.275**	.261**	.144**	.148***
	(.035)	(.113)	(.095)	(.056)	(.127)	(.13)	(.129)	(.129)	(.056)	(.057)
Log (Child family lab. days)	.101***	.065	.129	.004	.031	.016	.032	.027	.006	.009
	(.03)	(.108)	(.087)	(.045)	(.112)	(.109)	(.11)	(.112)	(.045)	(.045)

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Table A1 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log (Male hired labour days)	.124**	-.009	.227*	.148**	.092	.118	.121	.074	.142**	.139**
	(.059)	(.138)	(.13)	(.072)	(.128)	(.13)	(.132)	(.13)	(.07)	(.069)
Log (Female hired labour)	.196**	.222	.357**	.225***	.138	.113	.117	.168	.226***	.229***
	(.08)	(.305)	(.17)	(.08)	(.264)	(.277)	(.268)	(.267)	(.081)	(.08)
Log (Child hired lab. days)	-.048	-.128	-.399	.036	-.225	-.298	-.228	-.25	-.068	-.051
	(.162)	(.359)	(.315)	(.254)	(.346)	(.357)	(.34)	(.337)	(.228)	(.232)
Log (Qty. of org. manure)	.081***	.083**	.05	.044**	.071*	.07*	.07*	.077*	.042**	.042**
	(.014)	(.039)	(.031)	(.018)	(.041)	(.04)	(.04)	(.042)	(.017)	(.017)
Log (Quantity of urea used)	.053**	-.062	.018	.022	-.044	-.038	-.048	-.038	.018	.02
	(.022)	(.056)	(.063)	(.03)	(.055)	(.054)	(.053)	(.055)	(.031)	(.031)
Log (Quantity of pesticides)	.123	.35*	.058	.088	.374*	.366*	.426**	.375*	.087	.094*
	(.077)	(.188)	(.174)	(.058)	(.197)	(.201)	(.199)	(.197)	(.057)	(.057)
Log (Quantity of fungicides)	.038	.033	.235	.158***	-.004	-.029	-.016	.002	.163***	.158***
	(.085)	(.162)	(.18)	(.051)	(.185)	(.186)	(.185)	(.185)	(.05)	(.05)
Constant	9.649***	8.997***	10.331***	10.925***	10.945***	10.409***	10.68***	10.703***	10.819***	10.762***
	(.669)	(2.68)	(2.07)	(.904)	(2.883)	(2.764)	(2.821)	(2.849)	(.879)	(.877)
Observations	2040	164	251	1113	164	164	164	164	1114	1114
R-squared	.267	.309	.438	.393	.278	.286	.277	.269	.392	.392

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

Table A2: Effects of financial inclusion and other variables on agricultural productivity (female plot managers)

	(1)	(2)	(3)
Has an account in a bank or microfinance institution? (=1 if yes)	.157		
	(.873)		
Last credit obtained (=1 if cash)		-1.294***	
		(.459)	
Last credit obtained (=1 if kind)			.35
			(.419)
Log (Manager age)	.013	.549	.466
	(.149)	(.645)	(.655)
Log (Manager years of schlg.)	.023	.459**	.515**
	(.073)	(.222)	(.217)
Log (Household female adult)	.389**	-.995***	-1.004***
	(.155)	(.307)	(.342)
Log (Household male adult)	-.046	.784**	.712**
	(.141)	(.328)	(.335)
Child dependency ratio	-.011	.358*	.28
	(.083)	(.182)	(.191)
Log (Plot area in ha.)	-.947***	.776***	.653**
	(.233)	(.274)	(.297)
Log (Plot distance to home)	-.033	-.033	-.039
	(.081)	(.056)	(.061)
Log (Male family lab. days)	.238***	.461***	.378
	(.062)	(.169)	(.227)
Log (Female family labour)	.363***	.064	.013
	(.075)	(.144)	(.158)
Log (Child family lab. days)	-.043	-.553***	-.443***
	(.05)	(.129)	(.15)
Log (Male hired labour days)	-.093	-.117	-.155
	(.118)	(.331)	(.324)
Log (Female hired labour)	.321	.833*	.64
	(.212)	(.447)	(.421)
Log (Child hired lab. days)	.909***	-1.227**	-1.039
	(.294)	(.55)	(.679)
Log (Qty. of org. manure)	.012	.138**	.15**
	(.019)	(.063)	(.069)
Log (Quantity of urea used)	.184***	.073	.081
	(.047)	(.063)	(.071)

continued next page

Table A2 Continued

	(1)	(2)	(3)
Log (Quantity of pesticides)	.211	-.312	-.205
	(.213)	(.225)	(.222)
Log (Quantity of fungicides)	.52	-.177	.02
	(.478)	(.229)	(.248)
Constant	8.97***	9.24***	8.471***
	(.719)	(2.646)	(2.623)
Observations	758	75	75
R-squared	.238	.719	.69

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

Table A3: Effects of financial inclusion on agricultural productivity in Mali (male plot managers) – Alternative dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Has an account in a bank or microfinance institution? (=1 if yes)	-.152									
	(.123)									
Have savings in their accounts? (=1 if yes)		.365*								
		(.216)								
Obtained credit in the past 12 months? (=1 if yes)			.029							
			(.348)							
Log [Nominal amount of the loan for the last loan: FCFA]				.04*						
				(.021)						
Has an account in a classic bank? (=1 if yes)					.053					
					(.205)					
Account owned in account and postal checks? (=1 if yes)						-.069				
						(.237)				
Account held in MFI rural savings bank? (=1 if yes)							.141			
							(.212)			
Account held in form of mobile banking (=1 if yes)								-.069		
								(.217)		
Last credit obtained (=1 if cash)									-.281***	
									(.1)	

continued next page

Table A3 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Last credit obtained (=1 if kind)										.214*
										(.124)
Constant	6.909***	6.179***	6.464***	6.858***	6.411***	6.461***	6.43***	6.485***	7.588***	7.287***
	(.145)	(.331)	(.619)	(.356)	(.331)	(.332)	(.326)	(.313)	(.239)	(.226)
Observations	2042	164	251	1113	164	164	164	164	1114	1114
R-squared	.104	.192	.139	.137	.173	.173	.175	.173	.143	.138

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

Table A4: Effects of financial inclusion on agricultural productivity in Mali (female plot managers) – Alternative dependent variable

	(1)	(2)	(3)
Has an account in a bank or microfinance institution? (=1 if yes)	.551*		
	(.285)		
Last credit obtained (=1 if cash)		-.564*	
		(.285)	
Last credit obtained (=1 if kind)			.298
			(.328)
Constant	6.9***	7.626***	7.014***
	(.106)	(.379)	(.357)
Observations	758	75	75
R-squared	.031	.142	.133

Notes: Standard errors are in parentheses. The superscript ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels. The estimates are weighted in accordance with the survey design. All regressions include regional fixed-effects.

Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

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