Extended Abstract
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Paper/Poster Title	Developing financially inclusive and climate-smart smallholder sorghum value chain in Zimbabwe: Implications for food system transformation and sustainability.

Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.

Abstract	***200 words max***
Smallholder farmers are increasingly struggling to make a living from their land because of limited or no access to rural financial services and reliance on rain-fed systems. This study sets out to establish the factors that influence performance of contract farming and climate-smart smallholder sorghum value chain in Zimbabwe. The objectives of this study are to 1 Determine the influence of access to credit on adoption of improved sorghum varieties and conservation agriculture for smallholder farmers. 2. Determine the influence of access to credit on performance of contract farming in Zimbabwe. 3. Recommend government intervention to promote adoption and marketing of sorghum. The *study was conducted in four districts (Binga, Chiredzi, Hwange, Matobo) of Zimbabwe. A questionnaire was used to collect data from 281 respondents who were randomly selected from four districts. Logistic and Probit models were used to determine how access to credit influences adoption patterns and market participation respectively. Results showed that access to credit influences adoption and market participation. Farmers have been faced with resource limitation whilst contracting companies have challenges in collecting poor quality and low volumes of grain. The study recommends increased funding to smallholder farmers in the face of increasing risks of climate change.*	

Keywords	Adoption, technology, contract farming; market participation; credit access; small grain.
JEL Code	Q 0 General Q1 Agriculture Q2 Renewable Resource Conservation Q5 Environmental economics see: www.aeaweb.org/jel/guide/jel.php?class=Q)

Introduction	***100 – 250 words***

Globally, agriculture remains the mainstay of economic activity and a key issue for sustainable livelihoods. Besides promoting food and nutrition security, agriculture is a major revenue stream for all categories of farmers. Agriculture is the backbone of the Zimbabwean economy with the rural majority deriving their livelihood from agriculture and other related agricultural economic activities. Zimbabwe's status has declined from being the "bread basket of Africa" to being a net importer of agricultural commodities. To revive the previous status there is need to increase yields through financial support in terms of accessing improved seed varieties. In this paper, it is argued that financial support takes away the guess work out of agriculture and

provides more predictable and better yields in regions traditionally considered unsuitable for crop production. Regardless of evidence supporting the argument, limited financial support by smallholder farmers is an issue of great concern. This paper provides a glimpse of this problem using data collected from four districts (Binga, Chiredzi, Hwange and Matobo) in Zimbabwe's agro-ecological regions 1V and V.

Methodology	***100 – 250 words***

A four-case study approach to develop financially inclusive and climate-smart smallholder sorghum value chain in Zimbabwe in relation to contracts with smallholder sorghum farmers in agro-ecological regions IV and V of Zimbabwe was used. The study was conducted in 4 districts (Binga, Chiredzi, Hwange, Matobo). A mixed methods cross sectional study triangulated with multiple data sources was used. We used structured and semi structured questionnaires, interviews, key informants and focus groups discussions to collect our study data. Both probability and non-probability sampling techniques were used to select the study sample. A multistage sampling approach with purposive selection of districts dominant in sorghum production was conducted. For each district, two wards were selected randomly. A representative sample was used with a specific sample size per district calculated proportionally as follows: Binga-60, Chiredzi-95, Hwange-72 and Matobo-54, giving a total of 281 farmers. Purposive sampling was used to select districts (Hwange and Matobo) that were not into contract farming. The same was used to select districts (Binga and Chiredzi) who were into contract farming. Binary logistic and Probit models were used to determine how access to credit influences agriculture technology adoption patterns and market participation respectively in the studied areas. Statistical package Stata version 16 was used to analyse data. Secondary data obtained through literature review of policy documents, published articles and reports from development partners were used to compliment the findings.

Results	***100 – 250 words***

Determinants of agriculture technology adoption

Table 1 shows the results of access to credit versus technology adoption.

Table 1: **Access to credit versus technology adoption**

Variable	Total (%)	Non-Adopters (%)	Adopters (%)	Pearson Chi-Squared test Df	Test statistic	P-value
Access to credit						
Yes	43.4	37.2	51.2			
No	56.6	62.8	48.8	1	5.55	0.018*
Extension visits (per year)						
0	22.4	19.9	25.6			
1	27.1	30.8	22.4			
2	34.5	29.5	40.8			
3 or more	16.0	19.9	11.2	3	8.64	0.034*
Perception on extension advice	94.7	91.3	100			
Very useful	5.3	8.7	0	1	1.37	0.509[b]
Somewhat useful						
Contract farming						
Yes	25.6	30.1	20.8			
No	74.4	69.9	79.2	1	3.14	0.076
Access to weather information						
Yes	67.0	66.7	69.6			
No	33.0	33.3	30.4	1	0.272	0.602

Source: Primary data (2021)

***Statistically significant at 5%, Df-Degrees of freedom, [b]-Fisher exact*

Access to credit was higher among adopters (51.2%) as compared to non-adopters (37.2%). There was a strong association between technology adoption and access to credit $(\chi^2(1) = 5.55, p = 0.018)$. The majority of farmers that had access to credit were contract farmers. Farmers who used retained seed complained of a lack of cash or credit as the principal factor limiting their adoption.

Access to Credit in Market Participation

Access to credit was significantly associated with market participation. Households with access to credit were 0.723 times more likely to participate in sorghum markets than those without access $[\beta_6 = 0.723(95\%CI: 0.274\ to\ 1.172)]$. Having access to credit had positive influence on selling one's sorghum by a greater amount than other factors.

Discussion and Conclusion

100 – 250 words

This study is aligned with Mwangi and Kariuki (2015) who reported that access to credit stimulate agricultural technology adoption. The smallholder sorghum farmers who had access to credit were contract farmers. The majority of adopters used credit to acquire sorghum inputs hence these motivated farmers to adopt improved sorghum varieties. Contract farming had a positive influence on credit and market participation. Majority of farmers on contract farming

had access to credit as contractors loaned them inputs in the form of improved seed varieties at the beginning of the farming season.

Access to credit was significantly associated with market participation. The study is supported by Mutambara et al. (2013) who reported that, “the major challenge facing the food chain is access to credit due to solvency considerations.” Similarly, Kanyenze et al. (2011) indicated that, “a lot of literature on the finance growth nexus suggests that a well-developed financial sector plays a pivotal role in promoting the development of all sectors.” In the same vein, a study by Mutambara et al. (2013) reiterated that, “ambiguity on land ownership rights in Zimbabwe has made it difficult for the financial sector to assemble financial resources from savings for borrowing to the productive sector at reasonable interest rates.” There is still low interest in financing agricultural production in Zimbabwe due to issues of collateral. Financial institutions are not contributing significantly to production of sorghum. More farmer incentives should be available and a competitive price or subsidies for sorghum farming to ensure uptake by farmers.