

Extended Abstract

Paper/Poster Title	Impacts of marketing contracts on technical efficiency of citrus production
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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	<i>200 words max</i>
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Farmers seeking marketing contracts for product sales need to adjust their production behaviour in advance to meet the product attributes required by market buyers. However, little is known about whether marketing contract users are more efficient in farm production than non-users. This study contributes to the literature by examining the impacts of marketing contracts (written contracts, verbal contracts, and no contracts) on technical efficiency, taking citrus production in Jiangxi Province, China, as an example. We first use a stochastic production frontier model to calculate the technical efficiency scores at the individual level. Then, we use a multinomial endogenous switching regression model to estimate the treatment effects of marketing contract choices on technical efficiency. The SPF model estimates show that the mean technical efficient score is 0.626. The MESR model estimates reveal that the average technical efficiency scores for written and verbal contract users are 14% and 2% higher than those for no-contract users. The average technical efficiency score for written contract users is 8% higher than for verbal contract users. Our findings highlight the importance of helping citrus farmers use marketing contracts, which can help increase technical efficiency and farm productivity.

Keywords	Marketing contracts; Technical efficiency; Citrus production; Stochastic production frontier; Multinomial endogenous switching regression
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JEL Code	Cross-Sectional Models C21; Cost–Benefit Analysis D61; Contracts and Reputation L14; Agricultural Markets and Marketing Q13
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Introduction	<i>100 – 250 words</i>
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The stable connection between smallholder farmers and markets is essential to reducing risks and uncertainties of product sales and increasing rural incomes. However, in many developing countries, smallholder farmers face various barriers (e.g., inadequate information on output markets, high transaction costs, and market failure) when entering into domestic and international markets. A marketing contract is an institutional arrangement that helps better connect farmers to markets, which allow buyers and sellers to pre-agree on terms such as the price, quantity, timing, quality standards, and technical requirements for the products. Therefore, marketing contracts enable to decrease transaction costs, stabilise marketing channels, reduce uncertainties associated with sales prices, and mitigate market failures. Furthermore, farmers tend to adopt marketing contracts for sales, and this needs farmers to adjust their production behaviour in advance to meet the product attributes required by market buyers so farmers' production behavior and technical efficiency may change

in this process. However, little is known about whether marketing contract users are more efficient in farm production than non-users. This study provides the first attempt by investigating the associations between different types of marketing contracts and technical efficiency.

Methodology	100 – 250 words
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We first use a stochastic production frontier (SPF) model to calculate the technical efficiency scores of citrus production at the individual level. The SPF model is a parametric model, which helps distinguish the inefficiency term from stochastic variation and makes reasonable error distribution assumptions. Therefore, the SPF model is more appropriate for analysing data collected from agricultural sectors. Then, we use a multinomial endogenous switching regression (MESR) model to estimate the treatment effects of marketing contract choices on technical efficiency. Farmers self-decide which type of marketing contracts they choose when selling citrus to the markets, so sample selection bias may exist. The MESR model could mitigate selection bias issues arising from observed and is applicable to more than two choices for the treatment variable. Data used in this study are collected from a survey of citrus farmers conducted between October and November 2022 in Jiangxi Province.

Results	100 – 250 words
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The SPF model estimates show that the mean technical efficient score of citrus production is 0.626, ranging between 0.021 and 0.892. The MESR model estimates reveal that using written and verbal contracts had different impacts on the technical efficiency of citrus production. In particular, the average technical efficiency scores for written and verbal contract users are 14% and 2% higher than those for no-contract users. The average technical efficiency score for written contract users is 8% higher than for verbal contract users. We also find that farmers who experienced natural disasters were more likely to use written contracts, while those endowed with better education, larger farm sizes, and better production conditions were more likely to use verbal contracts.

Discussion and Conclusion	100 – 250 words
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Our results show that using written and verbal contracts had different impacts on the technical efficiency of citrus production. Specifically, average technical efficiency scores for written and verbal contract users were 14% and 2% higher than those for no-contract users. The average technical efficiency score for written contract users was 8% higher than for verbal contract users. Meanwhile, our findings have significant policy implications. First, the usage of written contracts should be widely promoted as it has a larger impact on technical efficiency than verbal contracts. In practice, by collaborating with rural farmer organisations, the government should organise workshops and trainings to help strengthen farmers' understanding of the benefits of marketing contract use when selling their products. Land fragmentation increases product heterogeneity, which prevents farmers from using marketing contracts. Therefore, the government should further promote land consolidation through land transfer, which can benefit economies and specialisation production scales, improving product sales with marketing contracts.