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Linking farmers to markets: Barriers, solutions, and policy options

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ABSTRACT

The 15 studies highlighted in this special issue collectively underscore the significant impacts of market participation on farmers' well-being, income, poverty reduction, dietary diversity, and rural economic growth. They also delve into the importance of marketing channel choice and the role of e-commerce in enhancing farmers' market linkages. In addition, they address farmers' preferences for market access interventions and the examination of market power within the agricultural industry, especially in low-income countries. The key findings include: (1) Market participation is critical for improving farmers' subjective and objective well-being, with studies demonstrating positive impacts on income, poverty reduction, and dietary diversity; (2) The choice of marketing channels significantly influences income, with evidence suggesting online sales can substantially increase farmers' earnings; (3) E-commerce plays a pivotal role in connecting farmers to broader markets, leading to income growth and enhanced market visibility; (4) Understanding and addressing farmers' preferences for market access through interventions like systematization policies and joint ventures can facilitate better market integration and support inclusive business models; (5) Analysis of market power within the primary foods industry reveals rising markups, particularly affecting low-income countries. These findings suggest that policies and interventions aiming to improve market access, promote e-commerce, and consider farmers' preferences and market power dynamics can significantly impact farmers' incomes, poverty levels, and overall rural economic development.

1. Introduction

Better access to domestic and international markets allows rural farmers to sell their products at higher prices, motivating them to increase the quantity, quality, and diversity of the goods they produce and sell more. Reliable market access also benefits regional income growth, food security, and poverty and hunger alleviation. Despite these significant benefits, smallholder farmers' market access has been constrained by a wide range of factors, such as remote locations (Barbier, 2023; Muto and Yamano, 2009), information asymmetry (Dey and Singh, 2023a; Ullah et al., 2020), high transaction costs (Gurmu et al., 2024; Markelova et al., 2009), and the lack of business skills (Otekunrin et al., 2019). These issues are more common in developing and emerging countries.

A large body of studies has investigated the factors influencing smallholder farmers' market participation and their decisions

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regarding agricultural commercialization (Abate et al., 2022; Alene et al., 2008; Assefa and Getachew, 2023; Haile et al., 2022; Rubhara and Mudhara, 2019). Alene et al. (2008) found that transaction cost is a crucial factor restricting farmers' market participation in Kenya. Rubhara and Mudhara (2019) found that the gender of the household head, access to draft power, access to extension, access to markets, access to finance, and number of crops produced are positively associated with commercialization, while age of the household head, number of cattle, off-farm income and communal land holding are negatively associated with commercialization. Analyzing data collected from wheat farmers in Ethiopia, Abate et al. (2022) concluded that farmers' age, educational level, selling price, wheat market experience, access to market information, off-farm income, family size, market orientation, distance to all-weather roads, and land size allocated for wheat are primary factors driving the smallholder wheat farmers' market participation.

Studies examining the impact of farmers' market participation and agricultural commercialization have primarily focused on household economic welfare (Dey and Singh, 2023b; Manda et al., 2020; Nguyen et al., 2023), food security and dietary quality (Kilimani et al., 2022; Nandi et al., 2021; Ogutu et al., 2020), nutrition intake (Haji, 2022; van Asselt and Useche, 2022), asset ownership (Ojong et al., 2022), and poverty (Bannor et al., 2022; Oduro and Osei-Akoto, 2008). For example, using data from smallholder farm households in Kenya, Ogutu et al. (2020) showed that agricultural commercialization significantly improved food security and dietary quality regarding calorie, zinc, and iron consumption. The study of Manda et al. (2020) revealed that cowpea market participation increased food expenditure by 1.6 % and household income by 0.7 % in Nigeria. Ojong et al. (2022) reported that agricultural commercialization increases asset and livestock ownership and income in Ethiopia, contributing to household economic development and reducing rural poverty. Estimating cross-sectional data of 175 households collected from Eastern India, Dey and Singh (2023b) found that vegetable farmers' market participation significantly increases household income and per capita consumption.

In parallel, the emergence of online sales platforms represents a transformative development in agricultural markets, offering farmers unprecedented access to broader markets and facilitating direct sales that can enhance agricultural returns, promote off-farm employment, and stimulate entrepreneurial skills (Liu et al., 2023; O'Hara and Low, 2020; Pesci et al., 2023). However, the literature reveals mixed findings regarding the impact of online sales on farm revenue. For example, Liu et al. (2023) reported that selling agricultural products online leads to higher selling prices that outweigh marketing costs, resulting in enhanced gross returns for farmers in China. In comparison, Pesci et al. (2023) found that Californian farmers who used online sales at the start of 2020 and continued using it as a market channel were likely to increase their sales but did not increase profitability. The finding of the mixed interplay between online market access and economic benefit underpins the need for further research to elucidate these dynamics and optimize strategies for rural development and market access.

Another critical dimension explored in the literature is the choice of export channels and the efficiency of agricultural value chains. The work by Fernández-Olmos and Díez-Vial (2014) delves into the strategic decisions farmers face between direct and indirect exports, each with its advantages and challenges. Indirect exports require a smaller commitment of resources and offer less control over channels in foreign markets than direct exports. Utilizing intermediary agents within the indirect export channel can help bridge the information gap between farmers and international buyers, thereby reducing transaction costs. Nevertheless, previous studies exploring the impacts of export channel choice did not account for selection bias (He et al., 2013; Li et al., 2023), which could lead to biased estimates and misunderstandings of the true impact of these export decisions on farm performance. Moreover, studies highlight the importance of government interventions in enhancing market efficiency and access, though existing research often points to institutional shortcomings that impede market effectiveness (Arvin et al., 2021; Ha et al., 2015). This underscores the necessity for a deeper understanding of how best to support small-scale farmers in developing economies through targeted strategies and interventions.

The role of e-commerce in alleviating market entry barriers for farmers has been a significant focus, particularly for its potential to reduce transaction costs and information asymmetry, thus fostering revenue growth (Ji et al., 2024; Wang et al., 2022; Yin and Choi, 2022). However, studies focusing on the revenue-increasing role of e-commerce present mixed findings. For example, Li and Qin (2022) and Zheng et al. (2023) documented the positive impacts of e-commerce on farmers' revenue within specific locales in China. Conversely, a segment of the literature casts doubts on the unequivocal efficacy of e-commerce in enhancing farmers' revenue. Critiques by Tang et al. (2022) and Couture et al. (2021) raised concerns over methodological approaches, sample representativeness, and the actual impact of e-commerce, suggesting that the benefits may not be as widespread or significant as initially believed. Historically, agricultural cooperatives have been instrumental in improving market participation and increasing income for smallholder farmers (Fischer and Qaim, 2012; Liu et al., 2019; Ma et al., 2023; Vásquez-León, 2010). These cooperatives could significantly influence farmers' adoption of e-commerce, potentially leading to enhanced market access. These studies call for more nuanced and methodologically robust research that not only elucidates the direct and indirect effects of e-commerce on farmers' revenue but also explores the synergies and tensions between cooperative membership and e-commerce adoption in enhancing household income and market access.

Across low-income countries, the literature underscores the importance of agricultural productivity enhancements to overcoming poverty and spurring economic development (Gollin, 2010; Warr and Suphannachart, 2021). While commercialization and technological innovation are highlighted as pathways to transition from subsistence to market-oriented farming, a significant gap exists in understanding the impact of market power on agricultural development. The rising market power and its economic implications suggest a research need for comprehensive studies to explore market power's effects on the sector's development and farmer well-being, overcoming challenges related to data scarcity and sector harmonization.

While the literature discussed above provides extensive insights into the effects of farmers' market participation and agricultural commercialization, significant research gaps require attention for a more nuanced understanding and policy development. There is a lack of a comprehensive exploration of the linkage between farmers' market participation and their subjective well-being, the

association between market-oriented farmland transfer and the utilization of outsourced machinery services, and the vulnerabilities of rural households to poverty amidst agricultural commercialization. Yet, gaps remain in understanding the income effects of online sales and addressing selection bias issues within export channel choices. Despite various strategies to improve market access, such as government-supported marketing channels, the literature lacks a comprehensive analysis of the effectiveness of these interventions in ensuring better prices for smallholders and the determining influencing their channel selection. Furthermore, the efficacy of e-commerce in genuinely enhancing farmers' market access and revenue growth, the impact of market power on agricultural development, and the effectiveness of government interventions in market access and efficiency are areas requiring further study. Addressing these research gaps is critical for developing targeted and effective policies and practices that better support agricultural communities, enhance market access, and improve the welfare of farmers and rural households.

To address those research gaps, we organized a Special Issue on "Linking Farmers to Markets: Barriers, Solutions, and Policy Options" at the *Economic Analysis and Policy* (EAP) journal to collect high-quality theoretical and applied research papers with solid policy relevance. This special issue aims to understand the linkages between farmers and markets comprehensively. Specifically, we strive to shed light on the barriers to farmers' market access, devise appropriate solutions, and widely explore the impacts of market access. The findings are expected to provide significant insights for policymakers to design appropriate policy instruments that improve smallholder farmers' market access and promote sustainable agricultural, rural, and social development.

Finally, 15 papers were selected after a rigorous peer-review process and published in this special issue. These papers examine how farmers' market participation impacts their subjective well-being outcomes (e.g., happiness and life satisfaction), objective well-being outcomes (e.g., incomes, poverty, and dietary diversity), and rural economic growth. They also delve into the importance of marketing channel choice in determining rural income growth, farm economic performance, and crop prices, as well as the role of e-commerce adoption in enhancing farmers' linkages and gains in farm revenues. Additionally, they address farmers' preferences for market access interventions using randomized conjoint experiments and choice experiments and the examination of market power within the agricultural industry, especially in low-income countries. The obtained findings provide policymakers with solid evidence and new insights on enhancing farmers' market access and helping them benefit from domestic and international markets.

The structure of this paper is as follows: Section 2 summarizes the papers received in this special issue. Section 3 introduces the international conference that was purposely organized for the special issue. Section 4 summarizes the key findings of the 15 papers published in the special issue, followed by a summary of their policy implications, presented in Section 5. The final section provides a brief conclusion.

2. Summary of received submissions

In total, 46 manuscripts were submitted to the special issue. The corresponding (submitting) authors come from 13 countries (see Fig. 1), signalling the broad diversification of submissions and the worldwide attention received. Just more than half of the submissions (56.5 %) were from corresponding authors working in China. The authors working in New Zealand submitted 3 manuscripts. This is followed by authors from Australia, Germany, India, Japan, Spain, and the United States, who submitted 2 manuscripts, respectively. Finally, we received 5 manuscripts submitted by the authors from Bangladesh, Cambodia, Indonesia, Italy, and Morocco.

3. ADBI virtual international conference

3.1. Selected presentations

The guest editors from Lincoln University (New Zealand), Asian Development Bank Institute (ADBI) (Tokyo, Japan), and Zhejiang University (China) organized a virtual international conference on the special issue theme. The conference was organized on 16–18 August 2023 and was supported by the ADBI.[1] The guest editors invited 20 corresponding authors whose papers fit the aims and scope of the *Economic Analysis and Policy* (EAP) journal and special issue theme to present at the conference. Fig. 2 illustrates the native countries of the presenters, showing that the presenters were from 11 different countries. Consistent with the initial submissions, most of the presenters (40 %) were from China.

The 20 selected papers were structured into 5 sessions at the conference. The conference organization team globally selected five chairs to manage presentations and discussions under each session. Each presentation was allocated 30 min. A speaker first gave a 15-minute presentation to introduce their manuscript. Then, an invited professional discussant commented on the manuscript and the presentation and interacted with the presenter for 10 min. Subsequently, the session chair initiated an interactive discussion between the speaker and other conference participants for 5 min. The well-structured presentations and discussions generated benefits for presenters, discussants, and all other conference participants for knowledge exchanges. Notably, the presenters could improve their manuscripts' quality based on the constructive feedback collected from the conference discussants and other participants.

[1] The conference agenda, biographies of the speakers, and conference recordings are available at the ADBI website: https://www.adb.org/news/events/linking-farmers-to-markets-barriers-solutions-and-policy-options

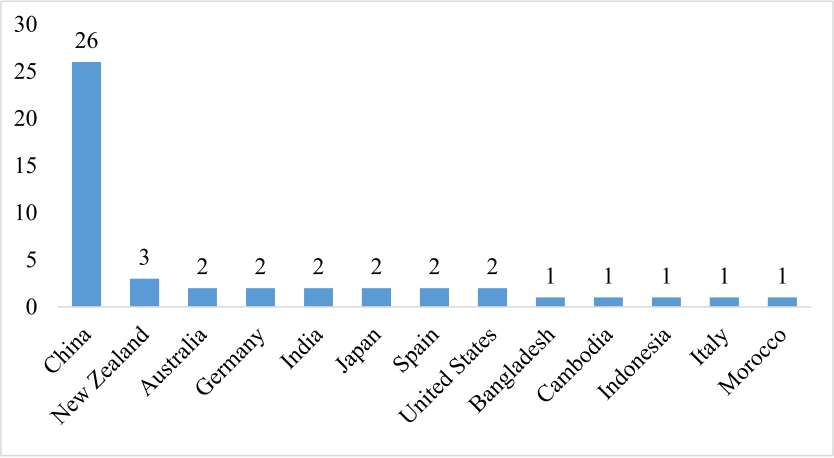

Fig. 1. Distributions of 46 receved submissions by corresponding authors' countries.

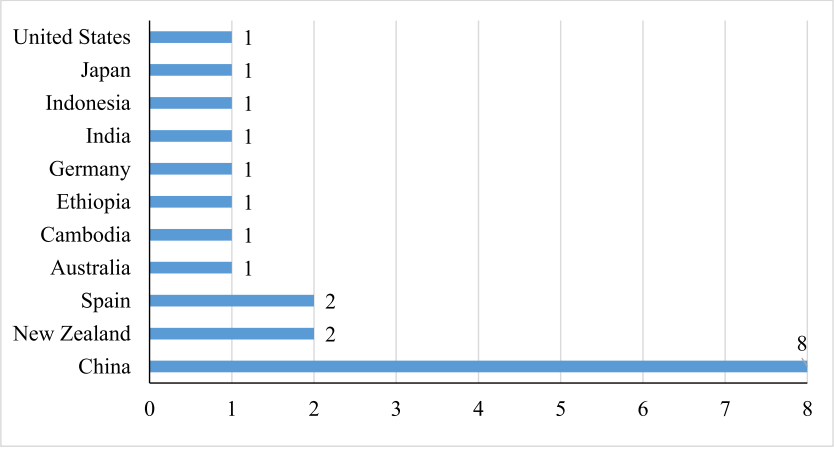

Fig. 2. Distriutions of selected presentations by corresponding authors' countries.

3.2. Keynote speakers and speeches

3.2.1. Keynote speakers

The guest editors invited two keynote speakers to present at the three-day conference. They were Assoc. Prof. Maria Fay Rola-Rubzen and Dr. Girma Tesfahun Kassie.

Maria Fay Rola-Rubzen is currently Deputy Director and Associate Professor at the Centre for Agricultural Economics and Development at the University of Western Australia. She has a Ph.D. degree in Agricultural Economics and a Master's degree in Economics from the University of New England, and a Bachelor's degree in Agricultural Economics (cum laude) from the University of the Philippines at Los Banos. Prof. Rola-Rubzen has authored/co-authored over 200 papers, reports, book chapters, and conference presentations and was co-editor of the book "Gender Dimension of Climate Change Research in Agriculture: Case Studies in Southeast Asia". She is the Project leader of a multi-country ACIAR-funded project on "Understanding Farm Household Management Decision-making for Increased Productivity in the Eastern Gangetic Plains of South Asia". Prof. Rola-Rubzen is an experienced agricultural economist and international development specialist. She has led several multi-disciplinary research and development projects in Australia, Africa and Asia. She has been a consultant to various organizations, including the Food and Agriculture Organization of the United Nations, the United Nations Economic and Social Commission for Asia and the Pacific, the Asian Development Bank, the International Rice Research Institute, and the Australian Centre for International Agricultural Research. She has been a member of consulting teams for the World Bank, USAID, Grains Research and Development Corporation and Winrock International.

Dr. Girma Tesfahun Kassie is a Principal Agricultural Market Economist with the International Centre for Agricultural Research in the Dry Areas (ICARDA) based in Rabat, Morocco. Dr. Kassie has about 25 years of research and teaching experience in different parts of Africa. His-research covers a wide range of topics, such as stated and revealed preference analysis, economics of food security, agricultural productivity, crop diversification, livestock production, and climate change. His-research aims to identify innovative

strategies and policy interventions to improve the well-being of small-scale farmers and promote sustainable agricultural development in Africa. Dr. Kassie has served as associate editor of *Agricultural Economics*, the *Journal of the International Association of Agricultural Economists*, for seven years and has served as president of the Agricultural Society of Ethiopia for one term. Dr. Kassie holds an Adjunct Professorship in agricultural economics at Debre Markos University in Ethiopia.

3.2.2. Keynote speeches

Assoc. Prof. Maria Fay Rola-Rubzen gave a speech, "*Linking Smallholder Farmers to Markets: Challenges and Opportunities Post the COVID-19 Pandemic*", on 16th August 2023. At the outset, Prof. Rola-Rubzen addressed how COVID-19 exacerbated global poverty, noting that smallholder farmers in regions like South Asia, Southeast Asia, Eastern Africa, and West Asia were particularly hard hit due to their engagement in low-intensity farming, resulting in low yields, limited market access, and insufficient profits. She emphasized the pivotal role of market access in converting farm productivity and efficiency gains into financial benefits, which is crucial for enhancing the income of impoverished farmers and improving the dietary quality of low-income households. Nonetheless, smallholder farmers encounter several barriers to market access, including inadequate access to high-quality seeds, chemicals, and fertilizers; limited access to credit and capital; a lack of knowledge about efficient farming systems; high transaction costs for meeting quality standards; the absence of cooperative and farmer organizations; and deficient transportation networks. Prof. Rola-Rubzen highlighted how innovations such as online shopping platforms provided by supermarkets, robust e-commerce systems, the advancement of information and communication technologies (ICTs), the adoption of e-services, and the implementation of climate-smart agriculture and farm mechanization and automation through Artificial intelligence (AI) and Internet of Things (IoT) have facilitated connections between farmers and markets. Through empirical and literature-based evidence, she demonstrated that contract farming, the establishment of agro-based clusters, the formation of rural producer organizations, and the development of business-supported, NGO-supported, and government-supported models, along with the creation of electronic national agricultural markets, are critical strategies for improving market access for smallholder farmers. Concluding her presentation, Prof. Rola-Rubzen stressed the importance of enhancing farmers' capacity to engage in markets. This involves increasing farm productivity, developing infrastructure, eliminating barriers to entry into physical and electronic markets, and empowering farmers to participate effectively in modern agrifood supply chains.

Dr. Girma Tesfahun Kassie gave his speech, "*Understanding farmers' marketing behaviour in developing countries: Lessons from selected empirical valuation studies*", on 17th August 2023. In the beginning, Dr. Kassie emphasized the critical role of agricultural markets in the developing world, which relies heavily on agriculture and faces challenges such as low efficiency in resource use and limited access to technology. Then, Dr. Kassie discussed how competitive markets can lead to an efficient allocation of resources, maximizing societal welfare as per the First Welfare Theorem. The presentation outlined the importance of farmers in agricultural markets, both sellers and buyers, and how their marketing behaviour significantly impacts agricultural supply chains, market dynamics, price formation, and overall market efficiency. Dr. Kassie explained that understanding farmers' preferences for technologies and market access can help prioritize research and development interventions, even though not all preferences are revealed or goods and services are tradable. He introduced stated preference analysis as a key research area, involving methodologies like contingent ranking and choice modelling to understand individuals' preferences, values, and choices through hypothetical scenarios. This includes searching for improvements over conventional methods, leading to the development of choice modelling, which considers goods as bundles of characteristics. Dr. Kassie presented empirical results from studies on various attributes of agricultural products and services, such as drought tolerance in maize and traits of indigenous cows, demonstrating farmers' preferences and the implications for marketing and product development strategies. These studies highlight the complexity of farmers' choices and the importance of considering these preferences in developing agricultural policies and interventions. Conclusively, he underscored the necessity of focusing on the right values in agricultural economic decisions, considering both direct-use values and other categories that might be equally or more important.

4. Summary of published articles

As a result of a rigorous double-anonymized reviewing process, the special issue accepted 15 articles for publication. These studies have estimated the impacts of market participation, investigated farmers' marketing channel choices, discussed the relationship between farmers' e-commerce adoption and market access, and discussed farmers' market access preferences and market power of the agricultural industry. Below, we summarize the key findings of the contributions based on their research themes.

4.1. Impacts of market participation

Farmers' market participation is crucial for boosting their income, enhancing well-being, and reducing poverty. It enables access to broader markets and improves livelihoods. Analyzing the impacts of market participation is essential for crafting policies that ensure equitable benefits, support sustainable development, and address the challenges farmers face in accessing and benefiting from markets. In this special issue, we collected five papers that analyzed the impacts of market participation and agricultural commercialization. The first paper analyzed how market participation affects farmers' subjective well-being. The second, third, and fourth papers investigated how market participation and agricultural commercialization affect households' objective well-being (e.g., incomes, poverty, and dietary diversity) and rural economic growth. The last paper on market participation estimated the associations between market-oriented farmland transfer and farmers' outsourced machinery service adoption, intensity, and cost.

Li, Ma and Gong's paper, "*Market participation and subjective well-being of maize farmers*", explored the associations between maize farmers' market participation and their subjective well-being. The authors used three variables, including market participation (a

dummy variable), sales ratio (a continuous variable), and sales frequency (a categorical variable), to comprehensively reflect the continuity and repeatability attributes of market transactions. They also used three variables (happiness, life satisfaction, and confidence about the future) to capture maize farmers' subjective well-being. A conditional mixed process model estimates the 2020 China Rural Revitalization Survey data collected by the Chinese Academy of Social Science. They found that market participation significantly boosted maize farmers' happiness, life satisfaction, and confidence about the future, mediated positively by maize income. The positive effects of market participation are more pronounced among middle and high-income farmers and those experiencing natural disasters. Participation in markets also improved objective well-being, with a significant increase in pork and milk consumption, indicating better nutrition intake among participating farmers.

Yitayew, Kassie and Yigezu's paper, "*Market participation and pastoral welfare in drought-prone areas: A dose-response analysis*", estimated the impact of pastoralists' participation in goat markets on household welfare, including per capita income, poverty headcount, and poverty gap. Using a bivariate selection model and dose-response function on data from 357 pastoral households, the authors found that flock size, transaction costs, and access to veterinary services significantly influenced both the propensity and intensity of market participation. Importantly, pastoralists were willing to pay for marketing services up to 97 % of the total variable transaction costs, indicating the financial feasibility of public investments in market infrastructure through cost recovery schemes. Market participation positively impacted per capita income, reduced poverty headcount, and narrowed the poverty gap among pastoral households.

Zheng and Ma's paper, "*Impact of agricultural commercialization on dietary diversity and vulnerability to poverty: Insights from Chinese rural households*", examined the impact of agricultural commercialization on rural households' dietary diversity and vulnerability to poverty. In this study, agricultural commercialization was measured as the ratio of the total value of crop output sold to the total value of all crops produced. Dietary diversity was measured by the dietary diversity score, calculated by ten food items that rural households consume. Rural households' vulnerability to poverty was measured using the vulnerability as expected poverty (VEP) approach. The authors utilized the instrumental variable (IV)-Poisson and IV-Probit models to account for the endogeneity issue of agricultural commercialization and estimate the 2021 China Land Economic Survey data collected by Nanjing Agricultural University (Nanjing, China). They found that a higher level of agricultural commercialization significantly improved rural households' dietary diversity but lowered their vulnerability to poverty. They also found that increasing agricultural commercialization significantly increases legumes, fruits, livestock, and poultry meat consumption.

Duan, Jiang and Qi's paper, "*Agricultural certification, market access and rural economic growth: Evidence from poverty-stricken counties in China*", examined the impact of agricultural certification on the economic growth of poverty-stricken counties, using the certification of the "famous, excellent, special, and new" agricultural products (the FESN certification) as an example. They combined a two-way fixed-effects model with an instrumental variable approach to estimate data from the China County Statistical Yearbooks from 2010 to 2020. They found that FESN certification significantly expanded farmers' market access to agricultural products and improved economic growth in poor counties. They also found that product premium and employment growth are the main channels through which *FESN* certification promotes rural economic growth.

Xu, Chen and Ahmed's paper, "*Market-oriented farmland transfer and outsourced machinery services: Evidence from China*", examined the effect of market-oriented farmland transfer on farmers' utilization of outsourced machinery services (OMS). The authors employed the two-stage least square and seemingly unrelated regression models to address the endogeneity issue of market-oriented farmland transfer and estimated data of 1286 renting-in rural households. They found that market-oriented farmland transfer increased farmers' OMS adoption, intensity, and costs, and the influence is channelled by reshaping the transaction characteristics related to uncertainty, asset specificity, and transaction frequency of OMS. They also found that technology demonstration and machinery purchase subsidies negatively moderated the relationship between market-oriented farmland transfer and OMS. Among farmers with different farm sizes and production tasks, market-oriented farmland transfer significantly increased OMS for smallholder farmers and labour-intensive production tasks.

4.2. Marketing channel choice

Selecting the right marketing channel is vital for farmers as it determines their access to markets, impacts income through price realization, and affects the cost-efficiency of reaching consumers. The appropriate channel enhances market reach, improves profitability, and supports the sustainability of their farming operations, directly influencing their livelihood and economic stability. We collected three papers on farmers' marketing channel choice in this special issue. The first paper compares the income differences between selling citrus online and offline. The second paper compares wine farm performance between wine farmers choosing direct export and their counterparts choosing indirect export. The third paper investigated the associations between marketing channel choices and crop prices received by farmers from the markets.

Zhang, Ma, Li and Yang's paper, "*Can citrus farmers earn more from selling online?*", estimated the income effects of online sales with a focus on citrus farmers. The authors employed an endogenous treatment regression model to address the issue of self-selection bias in online sales and analyze data collected from 926 households engaged in citrus production in Jiangxi Province, China. They found that online sales significantly increased net returns from citrus production, net farm income, and household income by 5000 Yuan/capita, 8580 Yuan/capita, and 17,830 Yuan/capita, respectively. They also found that the income-enhancing effects of online sales are greater for female household heads than for their male counterparts. In addition to directly boosting income from citrus production, online sales also have spillover effects on net farm income by stimulating the sales of other agricultural products and creating off-farm work opportunities at the regional level, thereby contributing to the growth of farm income and household income. Interestingly, the study revealed that the income-enhancing effects of online sales are more pronounced for female household heads than their male

counterparts.

Fernández-Olmos, Ma and Florine's paper, "*Linking Spanish wine farmers to international markets: Is direct export better than indirect export in improving farm performance?*", investigated whether direct wine export (i.e., farmers sell their products directly to customers and agents in another country) was better than indirect export (i.e., farmers sell their products to domestic third-party intermediaries who choose to re-sell those products to international markets) in improving farm performance. They utilized an inverse probability-weighted regression adjustment estimator to address the selection bias issue of export channel choice and estimate the data collected from 479 wine-exporting farmers from Spain. Unlike previous studies that only consider wine farm exporting performance from the objective perspective, this study also used a synthesized export satisfaction variable to capture wine farm exporting performance from a subjective standpoint. Indirect export through domestic intermediaries can help reduce information asymmetry and transaction costs, allowing exporters to sell their products at higher prices. However, there were no significant differences between direct and indirect exporters regarding export volume, value, diversity, and satisfaction. The research suggests that direct and indirect exports do not lead to differentiated profits, and wine farmers should carefully consider which export channel best suits their needs for accessing international markets.

Villacis, Kopp and Mishra's paper, "*Agricultural marketing channels and market prices: Evidence from high-value crop producers in India*", investigated the marketing outlet choices of fruit and vegetable producers in India and assessed the impact of these choices on the prices received for their products. Focusing on four high-value crops, namely okra, baby corn, onions, and pomegranate, the study employed a novel representative dataset from a collaborative survey by the United States International Agency for International Development (USAID), International Food Policy Research Institute (IFPRI), and the Indian Council for Agricultural Research (ICAR), involving 1349 smallholders. Using a simple expected utility framework, the research revealed that farmers' selection of marketing channels is closely tied to perishability constraints, significantly affecting farm profitability. The study emphasized the pivotal role of the crop type in determining specific market channels, challenging the effectiveness of "one-size-fits-all" policies.

4.3. Linking farmers to markets via e-commerce adoption

E-commerce is crucial in linking smallholder farmers to markets by overcoming geographical barriers, reducing transaction costs, and providing direct access to a broader consumer base. This digital platforms enhance market visibility, improve income through better price realization, and facilitate efficient supply chain management, significantly empowering small-scale farmers in the global marketplace. In this special issue, we collected three papers that helped us understand the important role of e-commerce in linking farmers to markets and the impacts of e-commerce adoption.

Yu, Cao, She and Li's paper, "*Unveiling the impact of E-commerce on smallholder livestock marketing: Insights on egg price premiums and mechanisms*", investigated the impact of e-commerce platforms on linking smallholder farmers to markets using egg products as a case study. The authors estimated a hedonic pricing model using 10,151 actual transaction data from JD.com in China. They evaluated the premium associated with smallholder attributes in livestock products. They uncovered how the information display and reputation incentive mechanisms of e-commerce platforms influence the premium paid for smallholder livestock products. The authors found that the smallholder attribute and other product attributes contribute positively to the premium of products. Besides, e-commerce platforms serve as avenues for linking smallholder farmers with the market. The information display and reputation incentive mechanisms play crucial roles in influencing product premiums. Moreover, optimal positive feedback allows consumers to quickly and accurately assess product attributes while encouraging smallholder farmers to uphold their reputation.

Li and He's paper, "*Revenue-increasing effect of rural e-commerce: A perspective of farmers' market integration and employment growth*", examined the impact of rural e-commerce on farmers' revenue in China. Unlike previous studies, they expanded their research to cover the entire country, making their findings more representative. The authors also examined the indirect effect of rural e-commerce on farmers' revenue through its affiliated industries and analyzed the role of transportation infrastructure as a moderator. They used a two-stage least squares regression (2SLS) model to analyze the 2018 China Labor-force Dynamic Survey data. They found that e-commerce has significantly increased farmers' revenue. They discovered that rural e-commerce-affiliated industries mediate between e-commerce and farmers' revenue. Furthermore, The authors reported that the mediating effect of rural e-commerce-affiliated industries becomes more pronounced with better transportation infrastructure. Lastly, the influence of rural e-commerce on farmers' revenue is more significant in families with higher average education and health levels.

Chen, Gan, Li, Lu and Rahut's paper, "*Linking farmers to markets: Does cooperative membership facilitate e-commerce adoption and income growth in rural China?*", investigated the associations between cooperative membership, e-commerce adoption, and household income, utilizing the 2020 China Rural Revitalization Survey. This is the first study that links cooperative membership with e-commerce adoption. The authors found that cooperative membership promoted rural households' e-commerce adoption, and cooperative membership and e-commerce adoption significantly increased rural household income. Participating in different types of cooperatives influences farmers' e-commerce adoption decisions and household income differently. Specifically, rural households' membership in village stock economic cooperatives did not significantly promote households' adoption of e-commerce; households participating in the marketing cooperative were more likely to adopt e-commerce; rural households having membership in the supply cooperative or other cooperatives (such as the land cooperative, labour cooperative, and agricultural products processing cooperatives) were less likely to adopt e-commerce.

Gao, Zeng and Liu's paper, "*Policy interventions and market innovation in rural China: Empirical evidence from Taobao Villages*", investigated the influence of policy interventions on the growth of rural e-commerce, aiming to ascertain whether rural e-commerce clusters emerge spontaneously. A Taobao village is described as a rural village with an annual turnover surpassing 10 million RMB on the Taobao platform, featuring over 100 active online stores or online stores managed by more than 10 % of the local households. Rural

e-commerce strengthens connections between farmers and markets, boosts competitiveness, fosters economic development, enhances living standards, and propels sustainable advancement in rural regions. The authors utilized a dynamic regression model with panel data covering 307 sample counties in Zhejiang, Jiangsu, and Guangdong provinces from 2013 to 2018, in conjunction with data from remote sensing techniques and geographic information system (GIS), as well as additional data obtained through web scraping to ensure a comprehensive and extensive macro-level analysis spanning a wider geographical area. The authors found that policy interventions have a significantly positive impact on the advancement of rural e-commerce. Moreover, the mechanism analysis illustrates that e-commerce policies have spurred the growth of enterprises in rural China, with the clustering of enterprises being pivotal to the establishment of Taobao villages.

4.4. Farmers' preferences for market access interventions

Grasping farmers' preferences for market access is crucial for motivating their engagement with markets. Tailored strategies that reflect these preferences can significantly lower barriers to entry, enhance profitability, and improve livelihoods. By focusing on what farmers value most in market access, initiatives can more effectively encourage their active and sustained participation. In this special issue, we collected two papers that investigated farmers' market access preferences by applying a randomized conjoint experiment and a choice experiment, respectively.

Saparova, Khan and Joshi's paper, "*Linking farmers to markets: Assessing small-scale farmers' preferences for an official phytosanitary regime in the Kyrgyz Republic*", aimed to identify the preferences of small-scale fruit farmers regarding the systematization policy and its potential benefits for enhancing crop phytosanitary safety while enabling market access. They conducted a randomized conjoint experiment (RCE) involving 378 farmers in the Chon-Sary-Oi district of the Kyrgyz Republic. Each policy alternative comprises six attributes: (1) type of service provision, (2) provision of production inputs, (3) provision of interest-free loans, (4) provision of market information, (5) provision of phytosanitary inspection frequency, and (6) annual fees. The authors found that attributes such as market information, interest-free loans, and production inputs—particularly virus-free seedlings—significantly increased farmers' participation probability in systematization. This study addressed the practical challenges Kyrgyz farmers face in meeting stringent phytosanitary standards, indicating the potential of a systematization policy to enhance market access.

Creppy, Bicknell and Renwick's paper, "*Understanding smallholder preferences for joint ventures in Ghana's rice sector: Improving market access through inclusive business models*", aimed at improving farmers' market access through inclusive business models. In particular, the authors explored farmers' preferences for Joint Venture model attributes and identified socioeconomic factors associated with their willingness to participate. To achieve these goals, the authors utilized a desktop literature review to identify the key attributes of institutional arrangements that facilitate value addition and market access for smallholders in developing countries. Then, they defined a hypothetical joint venture model and conducted a discrete choice experiment to determine the preferences of smallholders. This study is the first to use Decision Support Engineering (DCE) to determine smallholders' preferences for joint ventures in Ghana. The authors found that high investment requirements in joint ventures can deter farmer participation in business models for market access. However, blended finance, which combines grants and non-grant financing from private and public sources, can provide sustainable funding for smallholders.

4.5. Market power of the agricultural industry

Examining market power within the primary foods industry holds significant interest for policymakers aiming to foster development in low-income countries, as it can be a key contributor to market inefficiencies and impede economic growth. In this special issue, we have collected one paper that provides a global estimation of markups in the primary foods industry, offering valuable insights into this critical area.

Del Valle and Fernández-Vázquez's paper, "*Analyzing market power of the agricultural industry in Asia*", provided estimates of the markup for the primary foods industry (defined as the agriculture, hunting, logging and fishing industries) for 43 Asian countries. The markup, defined as the wedge between the selling price of a good or service and the marginal cost of production, is notoriously challenging to calculate due to the difficulty of obtaining data. This is the first study that systematically measures markups of agricultural activities in Asia and relates these estimated markups with indicators of participation in global markets. They estimated aggregate data in the Eora Input-Output Tables and a procedure based on Generalized Maximum Entropy. The authors found that markups for the primary food industry rose in aggregate between 1995 and 2015, and this rise was unequal between regions and income levels. Specifically, markups are systematically higher for countries classified as more low-income than high-income countries. Additionally, measures of globalization, such as value chain positioning and foreign value added, were found to reduce markups significantly.

5. Summary of key policy implications

The collection of 15 papers in this special issue sheds light on the critical aspects of linking farmers to markets, both domestically and internationally, revealing significant policy implications for enhancing market access and economic opportunities for farmers. The policy implications derived from this special issue include the following:

The positive impact of market participation on maize farmers' subjective well-being underscores the need for policies that facilitate market access, aiming to reduce barriers and enhance income opportunities. Such policies should specifically target vulnerable groups, including low-income farmers and those affected by natural disasters, to ensure they can access and benefit from market participation.

Connecting market access with health and nutrition programs could indirectly improve farmers' nutritional intake, suggesting a holistic approach incorporating economic and health objectives. The findings that pastoralists' participation in goat marketing significantly impacts per capita income, poverty headcount, and poverty gap highlight that policymakers should develop differentiated products for various consumer segments and provide farmers with reliable and timely market information, helping link goat farmers with markets. Policies should also focus on changing the crop-focused extension system to accommodate improved animal husbandry and veterinary services, thereby supporting the commercialization efforts of pastoralists. This approach can serve as a crucial instrument to increase income and reduce poverty among pastoral communities, suggesting the need for enabling policies that promote sustainable wealth accumulation strategies and better management of production and market risks.

The findings that agricultural commercialization enhances diet quality and alleviates rural poverty suggest that policies encouraging collective commercialization efforts, such as establishing farmer groups and agricultural cooperatives, could improve smallholder farmers' market leverage and negotiation capabilities. The findings also call for increased government support in areas like scientific research, crop diversification, and infrastructure development to foster the economic development of poor countries. Implementing a robust contractual framework for market-oriented transfers and outsourced machinery services, along with government interventions to address intermediary service shortages, could further facilitate market-oriented farmland transfer and promote investments in outsourced machinery services, driving sustainable economic growth in rural areas.

The findings of the income-enhancing effects of online sales underscore the importance of integrating digital platforms into the agricultural sector. To harness these benefits, there is a critical need for targeted educational programs to enhance farmers' skills in online sales, focusing on understanding the digital marketplace and leveraging its advantages. Such training should be tailored to address farmers' diverse needs, considering regional variations. It should pay special attention to older and less-educated farmers in less-developed countries who might face greater challenges in adopting new technologies. By fostering a learning environment where farmers can share experiences and success stories, these training programs can play a pivotal role in boosting farmers' confidence in online sales, encouraging wider adoption of digital sales platforms and improving productivity across the agricultural sector. The positive impact of indirect export on export prices emphasizes the need for Regulatory Councils and other stakeholders to facilitate these connections, thereby enabling farmers, who may lack the expertise or resources to enter international markets independently, to access these lucrative channels. This approach could democratize access to global markets for farmers with varying levels of export experience. The findings that the choice between direct and indirect export channels appears less significant regarding profit differentiation suggest that efforts should focus on ensuring farmers have the necessary support to access any available export pathways. Investments in infrastructure, education, and vertical coordination mechanisms, such as contract farming, could further empower farmers, particularly those dealing with high-value crops, enabling them to make informed decisions about market channels and improving overall market functioning. Policymakers should consider these insights to design comprehensive strategies that enhance agricultural productivity, market access, and income stability for farmers.

The finding that e-commerce enhances farmers' market access and revenue gains suggests a multifaceted approach to integrating smallholder farmers into e-commerce, emphasizing the need for regulation, training, and infrastructure development. By establishing evaluation systems and promoting regional public branding led by the government, consumers can better understand and trust smallholder livestock products, fostering a healthier online market environment. E-commerce platforms play a crucial role in ensuring the authenticity of product information and encouraging objective consumer reviews, which helps build a reputable online presence for smallholder products. Additionally, providing farmers with targeted training, particularly those less educated or from rural areas of developing countries, can significantly improve their online sales skills and market understanding. This approach boosts farmers' confidence in participating in e-commerce. It enhances product promotion, negotiation, and logistical management capabilities, contributing to the overall health and growth of the rural e-commerce ecosystem.

Developing rural e-commerce-affiliated industries and enhancing rural transportation infrastructure are essential for creating employment opportunities and reducing logistics costs. This, in turn, supports the broader adoption of e-commerce among farmers, enabling them to access markets better and improve their livelihoods. Special attention to digital assistance for vulnerable groups ensures the inclusive growth of rural e-commerce, allowing for a more equitable distribution of its benefits among farmers with varying levels of human capital. Establishing e-commerce service points in rural areas and promoting regional industrial clusters can further drive employment growth and foster the development of a robust rural e-commerce ecosystem.

Encouraging cooperative membership and the adoption of e-commerce among rural households is a vital strategy for improving rural household income. Local governments are urged to facilitate professional training and technical support for farmers, leveraging cooperatives as a primary channel for disseminating e-commerce knowledge. Addressing regional disparities in e-commerce adoption is crucial for narrowing the digital divide and promoting equitable development. The successful implementation of policy-driven approaches to rural e-commerce in China serves as a model for other developing countries, suggesting that targeted policy interventions and government support can significantly enhance the livelihoods of rural populations through digital empowerment. This holistic approach, combining government intervention with market operation, underscores the potential of rural e-commerce to contribute to sustainable economic growth in rural areas.

The finding that market information, interest-free loans, and production inputs significantly increase farmers' participation probability in systematization illuminates the crucial role of improving smallholder farmers' access to marketing information and systematization in enhancing their market participation, particularly in developing countries. It also suggests that improving farmers' access to vital resources such as interest-free loans, virus-free seedlings, and knowledge of packaging and labelling for phytosanitary safety can significantly influence their ability to meet global market standards and increase profitability. Given small-scale producers' institutional challenges, including limited market information and financial resources, the study advocates for policies to support farmers' systematization. This approach facilitates compliance with phytosanitary regulations and helps smallholders navigate the

complexities of agricultural markets more effectively. The emphasis on institutional economics in understanding market access highlights the need for targeted interventions that equip farmers with the necessary tools and information to thrive in competitive global markets.

6. Concluding remarks

This special issue comprehensively analyses the intricate relationship between market participation, agricultural commercialization, e-commerce adoption, and market access preferences, underpinning these elements' critical role in enhancing rural communities' livelihood and economic stability. Through a collection of 15 rigorously reviewed articles, the special issue illuminates the positive impacts of market participation on farmers' income, well-being, and poverty alleviation, emphasizing the necessity for policies that facilitate market access and reduce barriers. It highlights the importance of embracing digital platforms and e-commerce to bridge the gap between smallholder farmers and broader markets. It underscores the need for targeted educational programs and infrastructure development to support this transition. Moreover, the insights on farmers' preferences for market access interventions and examining market power within the primary foods industry underscore the significance of institutional economics in crafting effective policies that cater to the nuanced needs of small-scale producers in developing countries.

The policy implications derived from this issue advocate for a nuanced approach that recognizes the diversity of farmers' needs and the varying impact of market forces across different regions and income levels. It calls for enhancing farmers' systematization through access to vital resources such as interest-free loans and virus-free seedlings and developing differentiated products to cater to diverse consumer segments. The findings also suggest the potential of joint ventures and cooperative memberships as innovative models for improving market participation and income. Notably, the analysis of global markup estimation in the primary foods industry reveals the critical role of economic globalization and Global Value Chains in influencing market power, offering a pathway for policies promoting sustainable economic growth through trade and foreign investment. As this special issue underscores, targeted policy interventions grounded in rural agricultural markets' realities are pivotal for empowering farmers, enhancing agricultural productivity, and fostering sustainable economic development in rural areas.

CRediT authorship contribution statement

Wanglin Ma: Writing – original draft. **Dil Bahadur Rahut:** Writing – review & editing. **Tetsushi Sonobe:** Writing – review & editing. **Binlei Gong:** Conceptualization, Writing – review & editing.

Declaration of competing interest

The authors declare no known interests related to their submitted manuscript.

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