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Alternative agrifood systems and the economic sustainability of farmers' cooperatives: The Chinese experience

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Abstract

Most registered farmers' cooperatives in China are de facto private enterprises; while many bring economic gains to farmers, they do not function as cooperatives. Among the small minority that started as authentic cooperatives, however, most struggled to provide economic benefits to members, unable to achieve economic sustainability. The failure of true farmers' cooperatives in China has been widely studied; the success of the few that did become economically sustainable, however, remains poorly understood. Using a sample of 70 farmers' cooperatives across the country and comparing three "extreme cases"—cooperatives that are both authentic and economically successful—with the rest, this study argues that participation in alternative agrifood systems is the key to their success. In the Chinese context, smallholders are deeply integrated into the conventional agrifood system and have gained technology and market access through the mediation of private enterprises and public institutions, leaving little space for cooperatives. Only in alternative agrifood systems, which prioritize product quality and authenticity and value closer relationships between producers and consumers, do cooperatives, as a unique governance institution based on trust, have advantages. Our case analysis shows how cooperatives brought smallholders economic gains and achieved economic sustainability through shifting to ecologically sustainable farming and building alternative distributive networks. This finding adds a new dimension to our understanding of the relationship between smallholder cooperatives and sustainable development: in capitalist agrifood systems, ecologically sustainable agrifood alternatives provide the basis for cooperatives' social and economic sustainability.

KEYWORDS
alternative food networks, China, cooperatives, smallholder agriculture, sustainable agrifood system, vertical integration

1 | INTRODUCTION

In 2023, the number of farmers' cooperatives registered in China has reached 2,216,000, and nearly 50% of all rural households have become cooperative members (Gao et al., 2023). These numbers, however, paint a highly deceptive picture. The national legislation on farmers' cooperatives—Farmers' Specialized Cooperatives Law (FSCL)—that took effect in 2007 has made registering a farmers'

cooperative exceedingly easy: all one needs is producing the identification cards of five founding members (at least four of whom being farmers) and a charter in accordance with the FSCL.[1] At the same time, local governments, given the task of fostering the development of this "new entity of agricultural operation", as part of the central government's strategy of agricultural modernization, have used financial incentives and administrative fiat to manufacture the numerical growth of local cooperatives (Chen et al., 2023; Hu et al., 2017).

That most registered cooperatives in China are either empty shells or private enterprises masquerading as cooperatives—in other words, "cooperatives in name only" (CINO)—is a consensus in the literature (Deng & Wang, 2014; Ma et al., 2024; Pan, 2011); what varies is only the estimate of the percentage of CINOs in all cooperatives, which ranges from 60% to 90% (Deng & Wang, 2014; Hu et al., 2017; Ma et al., 2024; Yuan et al., 2019). Against this backdrop, any random sample of cooperatives in China inevitably contains mostly CINOs, especially private enterprises. Quantitative studies based on large random samples of cooperatives in China have found that many of these entities brought economic benefits to members (Ma & Abdulai, 2017; Zou & Wang, 2022). However, whether the researchers recognized it or not, these "cooperatives" became economically successful—in terms of making a profit for owners and raising income for farmer "members"—not as cooperatives, but as private enterprises interacting with farmer "members" through market transactions.

Ironically, the small minority of cooperatives that started as members-owned and democratically governed true cooperatives struggled to mobilize farmers' participation, maintain members' commitment, and, especially, stay economically competitive and financially solvent (Hale, 2013; He & Ye, 2020; Hu et al., 2023). In rural China, the rarity and economic feebleness of these true cooperatives form a sharp contrast with the large quantity and vibrancy of private agribusiness enterprises (whether registered as cooperatives or not), a puzzle that has been the topic of a lively scholarly debate (Hale, 2013; Hu et al., 2017; Huang, 2023a, 2023b; Yan & Chen, 2013). Most of these studies of true cooperatives in China focused on the struggles they experienced and the causes of their failure—understandable given that this is the norm among this population. The causes of this failure are both diverse and deep-rooted, including both macro-level conditions in the political economy and micro-level behavioral characteristics of farming households.[2]

In this study, departing from this literature that has convincingly explained the *failure* of true cooperatives, we intend to explain the *success* of the very few true cooperatives that have become economically sustainable by bringing members concrete economic benefits beyond what they could obtain from interacting with private agribusinesses. We ask: in a context where small farmers are already deeply integrated into the conventional agrifood system and have gained technology and market access through the mediation of private enterprises and public institutions, what can cooperatives do to bring additional economic gains to smallholder members and thus become socially and economically sustainable?

The literature on farmers' cooperatives tends to take the economic function—and hence sustainability—of cooperatives for granted: cooperatives, by pooling individual producers' resources together to access new technologies or market opportunities, enhance smallholders' agricultural productivity and market positions, thus bringing them increased incomes and other economic benefits (Bizikova et al., 2020; Fischer & Qaim, 2012; Grashuis & Su, 2019; Ma, Hong, et al., 2023). Most of these studies, however, are conducted in Global South countries where agricultural markets remain severely under-developed and smallholders face difficulties in raising their productivity or developing market access. In this kind of political-economic context, cooperatives have a structural role to play in organizing collective actions to enhance smallholders' productivity and commercialization (Blekking et al., 2021; Canwat, 2023; Delgado, 1999; Fischer & Qaim, 2012; Tefera et al., 2017). In the Chinese context, however, agricultural markets are more developed, and the state has provided the infrastructure that enables smallholders to raise productivity and gain market access (Han & Rogers, 2023; Zhang, 2013). If elsewhere providing these economic services forms the core function of cooperatives and the basis of their economic success, then in China, these functions have been either pre-empted or greatly curtailed, creating challenges for most true cooperatives to stay economically relevant while allowing CINOs to thrive (Hu et al., 2023). Against this backdrop of competitive and hostile market environment and widespread fraud and failure in China, it then becomes particularly interesting to investigate the small number of exceptional cases and explain the cause of their economic success.

In the rest of the paper, we first use the agrarian economist A.V. Chayanov's theory of peasant cooperatives to conceptually discuss the inherent economic disadvantages faced by smallholder cooperatives in capitalist agrifood systems. This discussion suggests that cooperatives are far more likely to become successful in alternative agrifood systems, where they are in advantageous positions vis-à-vis agro-industrial capital. We then briefly review the agrarian transition in China that has given rise to a capitalist agrifood system. The empirical analysis that follows draws on qualitative data we collected over a sample of 70 farmers' cooperatives in rural China and focuses on three exceptional cases that have managed to become economically sustainable in a hostile market environment. Contrasting them with those that have struggled within the conventional agrifood system, we show that participation in alternative agrifood systems is the key to their economic success. In the Discussion section, we connect this finding with the debate on the complex relationship between smallholder cooperatives and sustainable rural development and highlight the new contribution of this study: in a context like rural China, pursuing ecologically sustainable agrifood alternatives is vital to the social and economic sustainability of cooperatives.

2 | COOPERATIVES IN CAPITALIST AGRIFOOD SYSTEMS

As user-owned, user-controlled and user-benefiting organizations, farmers' cooperatives are established to serve the collective needs of their members and perform multiple functions (Royer, 2023). Much of

the literature on cooperatives in the Global South concentrates on their ability to boost productivity and promote agricultural commercialization. In contexts where agrifood market systems are underdeveloped, small farmers face limited access to technology and inputs, and struggle with low productivity and lack of reliable market channels, cooperatives can act as vital intermediaries. Through coordinating collective actions to address these structural obstacles, cooperatives produce positive economic impacts by enhancing smallholders' productivity and integrating them into markets (Fischer & Qaim, 2012; Francesconi et al., 2023; Tefera et al., 2017).

In countries where market systems are mature, agrifood commodity chains are dominated by powerful agribusinesses, and even smallholding farmers have achieved high productivity through industrial farming, farmers' cooperatives face a different and far more hostile environment. The chief challenge most smallholders now face is no longer under-developed market infrastructure or lack of technology access, but rather the subordination to the domination of powerful agro-industrial capital, exposing them to market risks and low revenues (Hogeland, 2013; van der Ploeg et al., 2012; Ye & He, 2019). To stay relevant to farmers' economic interests, cooperatives must help improve their marginalized position in an industrial agrifood system that is by design disadvantageous to them (Fulton & Hueth, 2009; Mérel et al., 2009; Saitone & Sexton, 2017; Ye & He, 2019). Most cooperatives, however, have not been able to make a sustained impact on members' economic welfare and, as a result, have either remained small-scale, offering marginal benefits to members, dissolved, or transitioned into non-cooperative organizations (Ajates, 2020; Fulton & Hueth, 2009; Hu et al., 2023). Even worse, as Van der Ploeg and Ye (2016) note, cooperatives can become agents of dominant food corporations, exercising control over farmers and perpetuating the power of these "food empires". This has led researchers to question the role and purpose of farmers' cooperatives in capitalist agrifood systems. Many either offered pessimistic predictions of the future of farmers' cooperatives or expressed deep concerns over their viability and effectiveness in an era dominated by large, integrated agribusinesses (Fulton & Ginnaiskis, 2013; Hogeland, 2013; Rhodes, 1993; Saitone & Sexton, 2017).

As hybrid entities combining economic and social objectives, the development and enduring success of farmers' cooperatives depends on both strong and persistent social trust and concrete and sustained economic returns for members (Iliopoulos & Valentinov, 2018). The research on cooperatives operating in capitalist agrifood systems focused primarily on the importance of social trust among cooperative members and between members and management for the formation and operation of cooperatives (Fulton & Hueth, 2009; Saz-Gil et al., 2021; Valentinov, 2004; Zhang, 2024). Less attention, however, has been paid to cooperatives' ability to generate sustained economic benefits for smallholder members in capitalist agrifood systems, where cooperatives have a very limited role to play in enhancing their productivity or facilitating their commercialization. Drawing on Chayanov's (1966, 1991) seminal work on peasant cooperatives and vertical integration, we argue that the key to cooperatives' economic success in capitalist agriculture lies in building a "cooperative vertical integration" to counter the dominant "capitalist vertical integration"—in other words, creating an alternative agrifood system.

Chayanov (1966, 1991) proposed a systematic cooperative theory addressing the survival and prosperity of smallholder farmers within a capitalist regime.[3] He argued that to counter the exploitation and dominance experienced in capitalist agriculture, smallholders must achieve economies of scale by forming cooperatives to compete with larger market entities. While in industrial sectors, economies of scale are primarily achieved through *horizontal concentration*, in agriculture, due to the differing attributes of various agricultural processes (preparation, production, processing, and distribution), a different efficiency logic prevails, and economies of scale are most effectively realized through *vertical integration* that integrates multiple upstream and downstream activities, conducted at various scales.

Historically, in capitalist agriculture worldwide, agribusinesses successfully adopted this strategy, integrating a wide range of activities from producing inputs, providing finance, to processing and distributing products, which allowed them to exert greater control throughout the value chain, subject smallholding producers to their domination, and extract more surplus from the latter (van der Ploeg et al., 2012). In Chayanov's view, this kind of capitalist vertical integration can become the "most repressive forms of capitalist exploitation" (1966, p. 269) for small farmers. Expanding smallholders' production scale through horizontal concentration does little to reduce their subordination in vertically integrated agro-industrial chains. Instead, smallholders' economic welfare hinges on their ability to build an alternative form of vertical integration, where cooperatives play an indispensable role. In Chayanov's envisioned "cooperative form of vertical integration," cooperatives manage all processes of agricultural preparation, production, processing, marketing, and distribution. This collective action achieves optimal efficiency through the integration of these activities.

Chayanov's view on the importance of "cooperative vertical integration" for farmers' cooperatives in industrial agrifood systems resonates strongly with contemporary scholars (Hu et al., 2023; Huang, 2023a, 2023b; Van der Ploeg et al., 2012; Ye & He, 2019). In fact, successful cases of farmers' cooperatives in the Global North became so precisely because they specialized not in production, but in marketing, branding, financing, and distribution—in other words, vertical integration (Bijman & Hendrikse, 2003).

Chayanov's fundamental insight is that the cause of smallholders' economic precarity and social vulnerability is rooted in the capital-dominated industrial agrifood system and thus, the path toward social and economic sustainability must be sought in building alternative market spaces for differentiated, "quality foods", a point made by many contemporary scholars (Foulton & Ginnaiskis, 2013; Goodman, 2003; Guillaumie et al., 2024; Moore & Donaldson, 2023; Ye & He, 2019). Chayanov emphasized cooperative vertical integration as a key feature of this alternative system, but paid less attention to changes that need to happen in smallholders' agricultural production. If farmers continue with conventional farming practices that rely on industrial inputs produced and supplied by agribusinesses and produce food products that cater to mass-market demands and are

processed, distributed, and marketed by corporate "food empires", that leaves cooperatives little chance to compete with these powerful corporate actors in conventional agrifood supply chains. Thus, "cooperative vertical integration" will be the most feasible when smallholders' agricultural production also shifts from conventional industrial farming to some sustainable alternatives such as organic farming. Cooperatives can then replace agribusiness firms to supply inputs (such as organic fertilizers, landrace seeds and breeds, and artisanal tools) to smallholders and process and distribute these differentiated products to niche markets. These two aspects—the "alternative food" that they produce in terms of its quality attributes and the "alternative networks" through which food passes—are precisely what define the "alterity" of sustainable agrifood systems and differentiate them from conventional agrifood systems (Rosol, 2020; Watts et al., 2005).

Furthermore, in contrast to the disadvantages they face in the conventional agrifood system, cooperatives, as a governance structure, have inherent advantages vis-à-vis private businesses in alternative agrifood systems. Alternative foods are defined by their special quality attributes—such as the avoidance of the use of industrial inputs in production, the adoption of ethical standards on animal welfare or social equity, and connections with local ecological environment or cultural traditions (Goodman, 2003; Watts et al., 2005)—all of which require some form of quality assurance (Albersmeier et al., 2009). Alternative distributive networks emphasize personal relations between producers and consumers and social embeddedness of the production and distribution processes (Anderson et al., 2014; Kloppenburg et al., 1996). Cooperatives, as an organization built on social trust, reciprocity and democratic participation, are the most effective governance scheme to both ensure compliance among a large group of smallholding producers and build social relationships throughout the supply chain (Groot-Kormelinck et al., 2022; Iyabano et al., 2022; Ortiz-Miranda & Moragues-Faus, 2015; Sirdey & Lallau, 2020; Yang et al., 2014).

In summary, given the dominance of agro-industrial capital in the conventional agrifood system, instead of seeking marginal improvements within that system, the new mission for farmers' cooperatives becomes coordinating the collective actions among farmers in adopting alternative farming practices and building alternative distributive networks (Bijman & Hendrikse, 2003; Mérel et al., 2009; Saitone & Sexton, 2017; van der Ploeg et al., 2012).

3 | AGRARIAN CHANGE AND COOPERATIVE DEVELOPMENT IN CONTEMPORARY CHINA

A wave of recent studies of the capitalist transformation of Chinese agriculture has shown that most smallholders in China today have become commodity producers, who are deeply integrated into markets, using commodity relations to access various productive resources such as land, wage labor, agrochemicals, and farm machinery, and sell their products to markets (Chen et al., 2023; Han & Rogers, 2023; Hu & Rahman, 2015; Rogers et al., 2023; Zhang & Donaldson, 2008). The success of smallholders in China in raising their productivity through technological intensification and market integration—probably unparalleled in the Global South—is the result of long historical processes and unique political-economic conditions. During the Mao era, China had established a national system of public agricultural extension services (PAES) that emphasized mobilizing the masses into participating in and contributing to the development and adoption of scientific farming methods (Schmalzer, 2016). Parallel to the PAES and working closely to support it was a national industrial and commercial system based on state- and collective-owned agrochemical enterprises and supply-and-sales cooperatives, which produced and supplied agrochemicals and seeds to meet farmers' needs, often below cost (Chen, 2021). After waves of reforms since the late 1970s, the PAES now remains an important force in disseminating technological information and knowledge as a public service to farmers (Cai et al., 2020). As the reformed PAES retreated from providing some of the extension services and agrochemical supplies, private companies quickly picked up the slack. Since the 2000s, both domestic agrochemical companies and global giants such as DuPont, Bayer and Syngenta have expanded rapidly their marketing channels in China and now have retail presence and sales agents across the country at grassroots levels (Chen, 2021).

Thanks to a unique land-right system that combines collective ownership and individualized use rights, smallholders in China enjoy far more secure land rights and equitable land access than their counterparts elsewhere in the Global South (Andreas et al., 2020). As a result of this, and further aided by the growing demands for higher-value foods from domestic urban markets, most farmland in China is still farmed by smallholders, producing for domestic markets. This forms a sharp contrast to many countries in the Global South where land was grabbed by foreign capital from smallholders and used for agro-export production, while domestic food needs were neglected (Patel, 2009).

China also had far superior physical and institutional infrastructure in the countryside that allowed agricultural markets to penetrate even remote corners of the country. Local governments often played a critical role in this development by setting up markets, building infrastructure, disseminating technologies, and recruiting investors (Han & Rogers, 2023; Zhang, 2013). The easy access to markets and deep penetration of commodity relations allowed most smallholder farmers in China to vertically integrate into various commodity systems. The challenge they face in the conventional agrifood system, unlike elsewhere in the Global South, is neither getting access to agrochemicals and tools, nor finding merchants to sell their produce. Rather, it is their disadvantaged positions in both input and output markets, where they face the domination by commercial capital, who often takes the lion's share in the value chain (Han & Rogers, 2023; Huang, 2012). To make things worse, smallholders now also face increasingly intense competition from what have been called "new entities of agricultural operation", including both agribusinesses and large-scale family farmers, which have been growing rapidly since the early 2000s thanks in large part to favorable government policies (Schneider, 2017; Zhang & Donaldson, 2008).

Keenly aware of these challenges faced by smallholders, the Chinese central government thought that organizing farmers into cooperatives would help raise the scale and technological intensity of their operations, reduce transaction costs, and improve their bargaining positions in markets. This motivated it to implement a series of policies to spur and support the development of farmers' cooperatives, including passing the FSCL in 2007 and providing financial subsidies to qualified cooperatives. These policies, however, have not had the intended effect of improving smallholders' positions in agricultural value chains (Deng & Wang, 2014; Hu et al., 2017).

A fundamental flaw of these policies, as we mentioned earlier, lies in the misunderstanding of cooperatives' role in a mature, capitalist agrifood system: while cooperatives can be effective in filling the vacuum resulting from market failures, when competing with private agribusinesses in mature markets, cooperatives can hardly generate superior economic returns to justify the much higher cost they incur in social organization. The disadvantages that smallholders face in the conventional agrifood system are inherent characteristics of this system. What cooperatives can do instead is organizing smallholders to "secede" from this system and build an alternative agrifood system (Kloppenburg et al., 1996).

4 | METHODS AND DATA

We use a qualitative approach to examine the developmental trajectories and the factors that shape the formation and operation of farmers' cooperatives in China. Our study extended over fourteen years, from 2009 to 2023, during which we collected data from 70 farmers' cooperatives spread across 20 provinces in China.[4] To generate a robust and diverse sample, we selected three types of cooperatives:

1. Award-winning cooperatives: cooperatives that were recognized and selected as local or national demonstration cooperatives.
2. Grassroots cooperatives supported by the New Rural Reconstruction Movement (NRRM): cooperatives driven by a group of social and intellectual activists who provided guidance and material support.
3. Ordinary farmers' specialized cooperatives: more typical, everyday cooperatives that were selected conveniently during our fieldwork, serving as a comparison to the other two types.

The aim of our study is to unearth the underlying factors that explain the success or failure of farmers' cooperatives in China. Operating under the assumption that challenges faced by these prominent cooperatives would be indicative of, if not amplified within, the lesser-known majority (Deng & Wang, 2014), we employed purposive sampling, choosing cooperatives that garnered widespread recognition from official entities, academic literature, social media, or through expert recommendations.[5] Thus, the first two types of cooperatives are over-represented in our sample.

Cooperatives in our sample were drawn from all sectors of the agricultural economy, including grains, horticulture, perennial tree crops, and livestock, input sales, output marketing, and credit finance. To collect data on these case cooperatives, we primarily relied on semi-structured interviews. The interview questions broadly covered various aspects, including but not limited to the developmental trajectory of the cooperatives, current operational processes and practices, member participation, performance evaluation, and the difficulties and challenges faced by the cooperatives. Most interviews were conducted by the research team together when visiting the case cooperatives. Team members were all familiar with the interview questions and took flexible role divisions during interviews. Typically, one member took the leading role in conducting the interview while the others assisted and took notes. The whole team then shared and cross-checked notes and materials to ensure accuracy and consistency.

We made efforts to ensure the diversity of interviewees in order to obtain a more comprehensive and objective understanding of the cooperatives. Our interviewees included cooperative managers and staff, local government officials, common members of the cooperatives, as well as individuals who were not members of the cooperatives. We also supplemented the primary interview data with a wealth of secondary sources. These included government reports, statistical data, academic literature, newspapers, and online materials. To evaluate 'sustainability', longitudinal data are essential. Large-N surveys can only take a snapshot and have a survivor bias in their sample selection. Our data collection, on the other hand, allowed us to follow some cases over time and witness how they evolved. During the data analysis, the research team manually coded the interview notes and secondary materials. Throughout this process, the research team engaged in intensive communication and discussion to reach a consensus on the coding themes.

We use the method of comparative case study and take the following steps to select focal cases from our diverse sample. First, 16 cooperatives in our sample were identified as "shell" cooperatives, characterized by a lack of actual membership or cooperative activities, most registered only to receive subsidies. We exclude these shell cooperatives (Type 1) from the analysis. Second, we classified the remaining 54 cases into four more types based on their social and economic characteristics. In this exercise, we were trying to analyze the variance among these diverse cases in the four social and economic characteristics that we aim to study: participation of smallholders in decision-making and benefit-sharing, social mobilization that built social trust among members, adoption of conventional or alternative farming practices, and efforts in vertical integration. The heterogeneity in these 54 cases qualifies them as "diverse cases" in the sense that they contain "maximum variance along relevant dimensions" (Seawright & Gerring, 2008; 300).

Table 1 summarizes the five types and their respective characteristics. Type 2, which is the large majority (43 out of 54 cases), were de facto private agribusinesses registered as cooperatives. The de facto private owners recruited some farmers as "members", but their interactions with the latter were nothing more than market transactions, which typically involved supplying inputs or services to farmers or buying agricultural products from them for processing or distribution, all at market rates. Many of these entities enjoyed sustained economic

TABLE 1 Classification of sample cooperatives ($N = 70$).

Types of cases	Key characteristics	# of cases
Type 1: Empty shells	• No productive activities. • Registered by local elites to receive subsidies.	16
Type 2: De facto agribusinesses	• De facto private enterprises, mostly owned and operated by local economic or political elites • No social mobilization of members; members' cooperation and participation in decision-making non-existent • Profits controlled by elite owners; no dividends distributed to member farmers • Fully integrated into conventional food systems; some pursued vertical integration.	43
Type 3: Authentic cooperatives in conventional food system	• Led by devoted local elites or activists, who mobilized smallholder members to join • Strong member commitment and cooperation at the beginning; tried to provide social services • Small-scale and lacked capital or technology • Benefitted smallholder members when operating, but easily became dormant or disbanded under economic stress • Compete in conventional food markets; some pursued vertical integration	6
Type 4: Alternative food cooperatives without vertical integration	• Led by devoted local elites or activists, who mobilized smallholder members to join • Strong member commitment and cooperation; tried to provide social services • Small-scale and lacked capital or technology • Adopted agroecological farming practices • Lacked distributional channels, unable to reap the high returns of alternative food products, struggling economically	2
Type 5: Vertically integrated alternative food cooperatives	• Led by either local activists, village leaders, or outside activists • Strong member commitment and cooperation; provided social services • Expanded from small-scale to larger-scale • Adopted agroecological farming practices • Built alternative distributive networks; able to secure high market prices for alternative food products • Good economic performances, benefits distributed to smallholder members	3 (Riverbend, Westhill, and Willow)

success and helped integrating smallholders into agrifood commodity chains, but they did so as private businesses, instead of operating as *authentic cooperatives*—with members' participation in asset ownership, governance, and profit-sharing.

Authentic cooperatives are not just economic organizations, but also social enterprises that are based on social solidarity and pursue social goals (Valentinov, 2004). The six cases in Type 3 met this requirement, as they all went through a process of social mobilization that built trust among members and involved members in democratic governance. They, however, did not adopt alternative farming practices but only tried to raise productivity and competitiveness in conventional food production. This economic approach put them in direct competition with conventional agribusinesses, in which their small scale and lack of capital and technology left them little chance of success. Without sustained economic returns to member farmers, the initial enthusiasm and social trust built through social mobilization quickly evaporated, leading to members' withdrawal, which further weakened the cooperatives' economic position (Hale, 2013). None of the six cases in our sample were able to escape from this downward spiral that drove them into dormancy or disbandment.

The two cases in Type 4 were authentic cooperatives that went one step further from those in Type 3: they adopted alternative farming practices and produced differentiated products (e.g., organic foods). However, as will be elaborated later, because of their inability to pursue alternative vertical integration, they struggled to find outlets for their products, unable to reap the expected higher returns and struggling to retain members' commitment.

Finally, the three cases in Type 5 were the only ones that both shifted to alternative farming practices and successfully achieved alternative vertical integration through consolidating multiple nodes of the commodity chain within their operations—for example, producing and supplying inputs, processing outputs, and distributing to consumers. Through vertical integration, these three "alternative food cooperatives" gained a greater share of the product value, reduced transaction costs, and circumvented the competition from conventional agribusinesses. They had the healthiest economic conditions and showed the greatest prospect of sustainability.

These patterns we find in our sample confirm the consistent finding in the literature about the widespread fraud and failure in farmers' cooperatives in China (Deng & Wang, 2014; Ma et al., 2024;

Pan, 2011; Yuan et al., 2019), which makes the economic success of the three cases in Type 5 all the more puzzling. These cases are the focus of our analysis, which will both examine their success and compare that with the failures of those in Types 3 and 4. These three cases are "extreme cases", selected because of their "extreme value on the independent (X) or dependent (Y) variable of interest" (Seawright & Gerring, 2008, p. 301), which in this case is their sustained economic success (our dependent variable) when all other cases failed to achieve economic sustainability. These extreme cases should not be treated as representative of all cooperatives in China; on the contrary, it is their deviation from the larger sample of cases in the background (the other 67 cases in the first four types), which gives us the full range of variation in cooperatives' economic sustainability, that makes them theoretically valuable.

5 | THE PATH TO COOPERATIVE SUCCESS: ALTERNATIVE AGRIFOOD SYSTEMS

5.1 | Case background: Social mobilization and the search for economic sustainability

As a governance structure, cooperatives differ from markets and hierarchies primarily because they rely on social trust—rather than price mechanism or authority relation—in coordinating interactions (Fulton, 1999; Saz-Gil et al., 2021; Valentinov, 2004). Without strong social trust and shared values among members, democratic governance, economic coordination, and long-term commitment would all become difficult if not impossible. When this social and moral foundation is not already present in the community as a pre-condition, then it must be created through lengthy processes of social mobilization and moral reconstruction (Zhang, 2024). This high social cost presents a major obstacle to the successful formation of authentic cooperatives, which explains why most registered farmers' cooperatives in China are de facto agribusinesses masquerading as such (Deng & Wang, 2014; Hu et al., 2017; Yuan et al., 2019).

All three successful cases in Type 5 went through lengthy processes of social mobilization and community building, but each took a different approach. The Riverbend Cooperative, located in southern Shanxi Province, is widely acknowledged as the most successful cooperative in contemporary China, and its experiences have been extensively documented in the literature (Hale, 2013; Hu et al., 2017; IPES-Food, 2018; Yang, 2017; Zhang, 2024). The bottom-up social mobilization at Riverbend started in 2001 when a group of local women activists in one village began to organize public dancing sessions. These dancing sessions soon spread like a wildfire and expanded to 43 villages, regularly joined by over 1000 women. This became the foundation of a new community that later expanded into conducting moral education, providing social services, and, eventually, organizing agricultural cooperatives.

The Westhill Village Cooperative in northern Shandong Province was formed through a top-down mobilization led by the village's Party branch. In 2014, the new Party Secretary, an experienced businessman who returned to the village, leveraged his personal connections to qualify the village for a pilot policy that brought in public finance for village reconstruction and farmland improvement. This development brought significant improvements to village governance and service provision, earning the trust from villagers and creating the social foundation for later economic cooperation. In the same year, the Party branch used the 200 *mu*[6] of farmland that had been newly reclaimed as the collective production base to form the cooperative, which soon convinced 133 smallholder households in the village to also pool their own land holdings (another 200 *mu*) into the cooperative.

In Willow Village in western Hebei Province, outside civil society actors led the social mobilization and community building. The village had been a study site for researchers and students from China Agricultural University (CAU) since the 1990s. Having established long-lasting bonds with villagers and gained their trust and respect, the CAU research team initiated an action-research experiment in 2010, aiming to use the nested market approach proposed by van der Ploeg et al. (2012) to raise farmers' income and strengthen social cohesion in the community (Ye & He, 2019). A cooperative that organized food production and distribution was formed in 2019.

Once the social foundation is built and an authentic cooperative formed, the cooperative still faces the challenge of delivering economic benefits to members, on which its economic survival depends. When these economic goals are pursued within the conventional food system, like what the six cases in Type 3 did, a range of factors, including fierce competition from agribusinesses, inherent risks in agricultural markets, and small cooperatives' disadvantages in resources, made these economic goals highly difficult to obtain. Even the three successful cases were no exception to this. Riverbend formed seven cooperatives in 2005, each organizing multiple smallholder households into the specialized production of one agricultural product in the manner of "horizontal integration". Within two years, however, all seven failed and disbanded unceremoniously. Before 2020, Westhill had mostly produced standard tomato varieties using conventional methods and sold them to conventional distributive channels. While the production was still profitable, it was no different from smallholders' individual operations, making joining the cooperative a moot point.

These challenges that cooperatives faced in the conventional agrifood system, widely discussed in the literature (see, e.g., Hale, 2013; Hu et al., 2023; Huang, 2023b), were a key reason that motivated them to shift to alternative agrifood practices. Most started with using agroecological farming methods to produce organic products, hoping those would allow them to eschew direct competition with agribusinesses and obtain higher returns.

Further challenges, however, awaited them. Reaching the niche market where consumers not only could pay the premium for "quality" foods but also had the trust in their quality and authenticity presented the biggest challenge (He & Ye, 2020; Martindale, 2021). One of the two cases in Type 3, Happy Rice, was a cooperative founded in the early 2000s in eastern Henan Province after receiving substantial support and guidance from NRRM activists. It produced high-quality

organic rice, but struggled to find a market for it: back then, there was no alternative distributive channel for organic products; without any brand recognition or a large enough quantity, neither consumers nor conventional retailers were willing to pay a premium for it or stock it. Eventually, that first year's harvest had to be sold by a NRRM activist, a professor from CAU, through multiple press conferences held in Beijing. Not surprisingly, that approach was not sustainable. Organic rice production by the cooperative soon terminated as members lost faith.

5.2 | Cooperative vertical integration and sustainable food alternatives

What set the three successful cases apart from the rest is that, in addition to successful social mobilization and transition to agroecological farming, they leveraged the strength of cooperatives as an organizational tool to develop alternative forms of vertical integration, which then allowed them to fully realize the economic potential of sustainable farming practices and obtain economic sustainability.

Unbeknownst to them, all three cooperatives followed Chayanov's prescription for cooperative development: they eschewed horizontal concentration in the farming operation, leaving that mostly to individual smallholder households, but instead organized cooperative activities on a larger scale in both providing services and inputs to producers and marketing and distributing products. While households remained the unit of farming, in all three cases, the cooperative both pushed and helped smallholders to shift from industrial farming to sustainable farming.

At Riverbend, each member household was asked to set aside a part of their farmland for "land conversion"—no use of chemical inputs for three years to allow soil fertility to recover before organic production could begin. In addition to household-based composting, the cooperative also carried out concentrated composting at a larger scale, as well as collectively purchased organic fertilizers at discounted prices to ensure the adequate supply of organic inputs to all households. All members were also required to shift from monoculture to multi-cropping: a typical household with 10 *mu* of farmland was expected to cultivate five different crops, including a staple grain for self-consumption. Multi-cropping helped to restore a healthier local ecological system, increased biodiversity, and reduced the incidence of pest and the need for pesticides. At Westhill, the cooperative persuaded members to shift from the mass market variety of tomato, which they had been cultivating for years, to a new variety of strawberry tomato, as well as change to agroecological farming methods, such as applying only organic inputs (bacterial fertilizer, rice husk, and soybean meal), re-introducing bee pollination, and using natural methods of pest control. Willow Village had a different background. It was a poor and remote village located in the mountainous area of a national level "poverty county"; 55 out of the 173 households in the village were officially designated "poverty households" (Ye & He, 2019). Farmers there had largely kept traditional farming methods and the practice of multi-cropping, which the CAU team, in their intervention, tried to preserve and restore.

Smallholders' agroecological farming practices would only become economically rewarding and sustainable if the cooperatives can build an alternative form of vertical integration. All three cooperatives devoted most of their efforts to this project—on the upstream, supporting smallholders' farming operations with provisions of technology, inputs, and credit services, and on the downstream, building distributive networks to reach urban markets. Due to space constraints, in the following, we can only selectively present representative experiences from the three cases. Most of the measures of vertical integration were pursued in all three cases to various degrees.

5.2.1 | Upstream integration

Lack of technological know-how is a major obstacle that prevents smallholders from shifting to either higher-value products or alternative farming practices (Hu et al., 2023). On their own, smallholders lack the resources to develop or acquire the know-how; cooperatives can play a critical role here by pooling together internal resources, broadening external reach, and increasing the potential return of technology investment.[7]

In 2020, when Westhill shifted to growing strawberry tomatoes in their greenhouses, their lack of know-how resulted in a failed harvest. Undeterred, the cooperative sought the expertise of a researcher at an agricultural research institute in Beijing. After extensive collaboration with the Beijing researcher, the cooperative mastered the techniques of growing this new variety using agroecological methods and disseminated these to all smallholder members. The cooperative also coordinated the construction of new-generation greenhouses for its members. Previously, smallholders at Westhill had been growing vegetables in traditional mud-built greenhouses with low height and poor ventilation. The new-generation greenhouses that strawberry tomato production required—equipped with automated systems for drip irrigation, ventilation, lighting, and temperature control—each cost over 400,000 *yuan*[8] to build. The cooperative worked with Postal Savings Bank's county branch to qualify the village as a "creditworthy" village and facilitated the bank's lending to households for their greenhouse construction. Instead of leaving smallholders to deal with construction companies on their own, the cooperative put the construction of all greenhouses into a collective bidding process, which both lowered construction costs and ensured consistent quality. Once these new greenhouses were operational, members reported that they could save labor use by 30% to 40% than using traditional greenhouses, while the strawberry tomatoes produced in these greenhouses could sell at double the price of the mass market variety, translating into tangible economic gains.

Riverbend went further in addressing smallholders' difficulties in accessing credit from formal financial institutions—it vertically integrated financial services into the cooperative. In 2012, Riverbend launched an internal credit cooperative, using funds from members' capital contributions and savings deposits plus a 10-million-*yuan*

interest-free loan from a Hong Kong-based foundation. Lending is only to members, whose farming operations must conform to the cooperative's principles of sustainable farming. Interest rates were pegged to the lending quantum: loans below 2000 yuan were interest-free with a three-month repayment period, while the highest monthly rate was 1.5 percent for those above 30,000. In 2018, the credit cooperative issued over 20 million *yuan* in loans to over 1000 smallholder members. The interest generated from these loans became the most important source of fund that financed the cooperative's social services.

In 2008, Riverbend also started collective purchases of agricultural inputs. By 2014, this had expanded to include not just all necessary agricultural inputs but also a wide range of household consumption items for its 4000 rural member households. In 2016, the cooperative's collective purchase of consumption goods reached a total of 13 million *yuan*. By establishing direct contacts with manufacturers or wholesalers and ordering in bulk, the cooperative not only obtained favorable prices but also ensured product quality, shielding members from risks such as defective seeds and contaminated feed.

Riverbend also adopted a conscious strategy of withdrawal from conventional markets and took a multi-pronged approach implementing it. The collective purchase already shielded members from a lot of the transactions with external markets. The cooperative also established a system of internal circulation of goods. It first coordinated the crop choices of member households to meet internal food consumption demands, and then the exchange of these essential food products (wheat, rapeseed oil, fruits, and vegetables) among member households. The practice of multi-cropping spread out the harvest seasons across the year and reduced smallholders' need to hire wage workers . The cooperative also tried to restore the use of local traditional crop varieties, heirloom seeds, and agroecological farming practices. Now supplying much of the seeds, organic fertilizers, and biological means of pest and weed control internally, it further reduced smallholders' dependence on industrial supplies from agro-chemical companies.

Willow has also conducted an array of upstream integration practices to maintain the distinctiveness of their products and increase their economic value. To preserve local tradition and enhance economic value, 16 member farmers formed a social network to preserve local seed varieties. With help from the CAU team, they managed to join a national traditional seed exchange network, which enriched the seed portfolios of member farmers. Efforts were also made to preserve local livestock breeds, which allowed the cooperative to provide meat with distinctive quality to urban consumers. In recent years, the cooperative also initiated bulk purchases of sweet potato seedlings in collaboration with a local company, reducing costs for member farmers.

To help farmers acquire the know-how in ecological farming, the cooperative established a regular training program called "Small Farmers, Big Class" with the support of the CAU team. This program holds training sessions on agricultural production and rural daily life. Additionally, with help from CAU team, member farmers visited established programs in other regions, such as Yunnan and Beijing, to learn about ecological pest and weed control technologies, as well as techniques in slaughtering, packaging, storage, and logistics. Overall, these upstream integration practices have reduced production costs and risks for member farmers, strengthened their commitment and loyalty to the cooperative, and thereby enhanced the cooperative's economic sustainability.

5.2.2 | Downstream integration

In recent years, the increasingly affluent consumer population in urban China has greatly increased its appetite and demand for quality foods (Si et al., 2015). This demand, which has become the main driving force spurring the development of alternative food practices in China, was channeled into agricultural production mostly through urban-driven initiatives—urban individuals, civil society groups, and corporations going to rural areas, renting farmland, and organizing alternative food production. Rural smallholder farmers had minimal participation in these urban-driven initiatives and were thus unable to reap the benefits of this transition to alternative food practices (Si et al., 2015). Two key factors precluded rural farmers' participation in meeting the booming urban demands for quality foods: their lack of knowledge of the specificities in urban consumers' needs and preferences and, even if they knew what to produce, their lack of distribution channels to reach this particular segment in the urban market (Ye & He, 2019). The three successful cases in our sample all acquired this knowledge and developed alternative distributive networks to reach urban consumers, but each took a different approach.

The leaders of Riverbend first sensed the growing demand for quality food when they noticed that relatives of members and former residents of the villages living in the two nearby cities would take back large quantities of farm products every time they visited the villages. In 2014, the cooperative experimented with establishing a retail shop in each city, both simply named "The Rice-flour-oil-vegetable Shop", selling organic produce from the cooperative. While the sales had been good, they soon discovered that consumers' perception of value and quality in the foods they consumed differed significantly from theirs. Consumers simply treated the alternative foods as just a more expensive commodity that substituted their conventional foods, without changing their unhealthy lifestyles or misinformed views about the quality of foods (e.g., based on appearances rather than provenance). The cooperative then shifted the operational model to members-only direct delivery. By integrating urban consumers as members, who were expected to comply with the cooperative's moral principles and regularly visit the villages to connect with rural producers, the cooperative was then able to re-educate urban consumers and align their consumption preferences and practices with agroecological principles. Urban member households who received regular deliveries of food items directly to their homes were required to open their kitchens for inspection to ensure no excessive use of artificial ingredients. Repeated offenses and other moral deficiencies such as gambling and domestic abuse would result in revoked membership. This seemingly intrusive approach gradually gained acceptance among urban consumers. By 2018, the urban membership base had grown to 8000 households and annual sales revenue reached 30 million *yuan*.

The Willow case in some way resembled those urban-initiated alternative food networks, as it was the CAU research team that brought the "nested market" model to the village. The key difference, however, is that rural farmers in Willow Village were deeply involved in all operations, and the food production was done by rural farmers on their household plots, coordinated by the cooperative. The construction of alternative distributive networks was started by the CAU research team who used their personal social networks to recruit consumers in Beijing. Once the connections had been made, the cooperative not only took over the distribution and delivery operations, but also continued to expand the consumer base, which by 2020 reached 400 households in Beijing. This alternative distributive system initially faced problems similar to what Riverbend had encountered. Urban consumers, who had become used to the uniform appearance, unlimited quantity, appeasing packaging, and refined preparation of conventional foods purchased in supermarkets, used those standards to judge the quality and value of the alternative foods distributed by Willow and were unhappy with the perceived "inferiority". Farmers at Willow Village were equally annoyed by urban consumers' ignorance and pickiness. The CAU team had to step in to bridge the divide and culturally and socially integrate consumers and producers into an "alternative economy" (Gibson-Graham, 2008) based on shared values and understandings. On producers' side, new investments were made in processing, storage, and packaging facilities, which allowed more processing and packaging to be done at Willow Village and the food to be presented to consumers in ways that they are more familiar with. On the consumer side, more interactions with producers, the rural community, and the agricultural production process were introduced, including online chat groups, meetings with farmers at pick-up points, village visits, and social activities (He & Ye, 2020). This experience shows that building an alternative distributive network requires more than just the infrastructure that facilitates the physical movement of food products, but also both an alternative cultural framework that reconstructs consumers' perception of foods and a "commensal community" that socially integrates producers and consumers (Kloppenburg et al., 1996; Watts et al., 2005).

At Westhill, the new Party secretary, Mr. Lu, who before his return had been doing cross-border trading with Russia, played the pivotal role in vertically expanding the cooperative's operations into marketing and distribution. Mr. Lu leveraged the long-term partnership that he had formed in his previous career to place the cooperatives' strawberry tomatoes and other organic products in supermarkets in Moscow and other large Russian cities, as well as in Hong Kong and Macau. On the domestic market, the cooperative registered a trademark, "Westhill First Grade", for its strawberry tomatoes, and skillfully used e-commerce platforms to market them. Westhill now has an e-shop on all major e-commerce platforms, including JD.com, Taobao, and TikTok, selling directly to consumers. Outputs from member households are now collectively sold by the cooperative through these channels under the same brand name and using uniform packaging. The cooperative also invested in infrastructure such as a high-standard sorting center and a cold storage facility to enhance product quality.

Overall, in all three cases, thanks to successful vertical integration, the cooperatives were able to sell their alternative food products at prices significantly higher than the prevailing market prices for conventional items. More importantly, since they directly controlled much of the distributive networks, the cooperatives and their smallholder members retained most of the value created.

6 | DISCUSSION: COOPERATIVES AND SUSTAINABLE AGRICULTURAL DEVELOPMENT

The experiences of these three successful cases—and their contrast with the rest in our sample of 70 cooperatives, especially those authentic cooperatives that failed to obtain economic sustainability—point to participation in alternative agrifood systems as the key in creating the divergent outcomes. This finding reveals a new dimension in the relationship between smallholder cooperatives and sustainable, alternative agrifood practices that has not been noted before.

Existing research on this relationship focused on how cooperatives can contribute to the development of sustainable agrifood systems. A growing body of research has found evidence of cooperatives' positive contributions, which ranged from promoting sustainable farming practices, to disseminating eco-friendly agrotechnologies, and enhancing product prices (Anderson et al., 2014; Bijman & Höhler, 2023; Candemir et al., 2021; de Freitas, 2023; Fayet & Vermeulen, 2014; Ma, Marini, & Rahut, 2023; Zhang, 2024), a finding that our study also supports. In addition to these, however, studies have also shown that cooperatives are not the only organizational form for creating sustainable food alternatives, nor do they always successfully enhance sustainability (Ajates, 2020; Bijman & Höhler, 2023; Ortiz-Miranda & Moragues-Faus, 2015). The impact of farmers' cooperatives on the three dimensions of sustainability (economic, social, and environmental) is highly variable, depending on the complex relationships between farmers' production and external political-economic conditions (Bijman & Höhler, 2023; Fischer & Qaim, 2012; Ma, Marini, & Rahut, 2023; Ortmann & King, 2007). In many of the studied cases, improving smallholders' economic sustainability through agricultural intensification and commercialization is the primary goal of the cooperatives, while social and ecological sustainability is often sacrificed as trade-offs (Abebaw & Haile, 2013; Blekking et al., 2021; Canwat, 2023). These cooperatives therefore mostly deepen small farmers' integration into the conventional, industrial agrifood system far more than develop a sustainable alternative system (Tefera et al., 2017). Such integration, however, is well known to have long-term negative impact on social equity and ecological environment; so too are the conflicts between short-term economic gains and these long-term sustainability goals (Ajates, 2020; Candemir et al., 2021; Liang et al., 2023; Wu et al., 2023).

What remains understudied and poorly understood is the importance of alternative agrifood systems to the economic sustainability of farmers' cooperatives. A key reason, as we pointed out before, is the lack of understanding that the basis of cooperatives' economic

sustainability varies in different economic contexts. Take for example smallholders' participation in fair trade coffee schemes in Africa and Latin America. In these contexts, where smallholding coffee growers lacked access to export markets, cooperatives performed the crucial functions of connecting them to various supply chains (conventional, organic, or fair-trade) and providing technology upgrading (Kolk, 2013; Taylor et al., 2005). When these services formed the basis of the cooperatives' economic sustainability, then whether a cooperative participated in alternative schemes such as fair trade "does not add distinctive traits to cooperatives' performance" (Ortiz-Miranda & Moragues-Faus, 2015, p.44; see also Parrish et al., 2005). In countries like China, however, cooperatives faced a different economic context. Smallholders have access to productivity-enhancing technologies and market opportunities in a mature capitalist agrifood system, provided by agribusinesses and state institutions. The distinctive economic functions that cooperatives can perform in the conventional agrifood system are limited in scope and difficult to achieve, as the literature on the widespread failure of true cooperatives in China has adequately documented (Hale, 2013; Hu et al., 2023; Lammer, 2012). It is in this context, our analysis suggests, that participation in alternative agrifood systems becomes the new basis of cooperatives' economic sustainability. Furthermore, as mentioned earlier, cooperatives as a governance structure are also uniquely positioned to help smallholders shift to sustainable farming practices and construct alternative distributive networks.

Thus, in a mature capitalist agrifood system, transitioning to alternative agrifood practices helps smallholders circumvent direct competition with agribusinesses and escape from the domination of agro-industrial capital in commodity chains; cooperatives, by playing the leading role in this transition, can again become vital for smallholders' social and economic sustainability and find a new basis for their own economic survival.

7 | CONCLUSION

A sustainable food system, one that constitutes economic, social, and environmental sustainability to ensure food security and nutrition (FAO, 2018), is an integral part of the sustainable development agenda. As "almost each of the 169 targets listed under the SDGs is, to a greater or lesser extent, related to food and farming (Terlau et al., 2019, p.523)", family and smallholder farmers—the backbone of the agri-food system in most developing countries—are therefore a key actor for the implementation of the UN Sustainable Development Goals. In a capitalist, industrial agrifood system like the case in contemporary China, the threat to sustainability comes not only from the negative environmental impacts of industrial agriculture, but also the economic precarity and social vulnerability that smallholders experience when competing with agribusinesses in production and transacting in agrifood commodity chains. Our analysis here suggests that the most valuable economic service that cooperatives can provide to smallholders in such a context is facilitating their transition to alternative agrifood systems. Farmers' cooperatives must therefore aid smallholders in pursuing the two forms of "alterity" and achieve economic sustainability through so: first, adopting sustainable farming practices and producing alternative foods, and second, building an alternative form of vertical integration. In doing so, smallholders can then reduce their dependence on industrial inputs and the agro-industrial capital that produces and supplies those, circumvent direct competition with more powerful, large-scale producers in the conventional market, and obtain both greater autonomy and higher economic returns from a more socially just market system.

We derived this conclusion from a comparative analysis of a sample of 70 cooperatives in China. The vast majority of cooperatives in our sample failed to reach there, tripped over by three major obstacles. Most either did not intend to or manage to socially mobilize smallholders to commit to a long-term project or form a community based on shared values and strong bonds, without which they could not operate as true cooperatives (Type 2). Some that had started on a strong social foundation mistakenly chose to compete within the conventional industrial agrifood system and soon fell to competitive pressures and market fluctuations (Type 3). Even those that chose the path of alternative food, two fell before the last hurdle as they failed to achieve vertical integration and reap the economic returns from their alternative food products (Type 4). In contrast, the only three successful cases devoted long-term efforts to building trust in the community and re-shaping values, then organized smallholder to shift to alternative food production, and finally, successfully established vertical integration, securing stable market channels for their high-quality products.

Our study makes two contributions to the scholarship on smallholder cooperatives and sustainable agricultural development. First, it adds to the study of farmers' cooperatives in rural China. While existing studies either focused on explaining the widespread fraud and failure or mistakenly treated the income-raising effects of CINOs as the success of true cooperatives, this study fills a gap in the scholarship by explaining how a small minority of authentic cooperatives obtained economic success through shifting to alternative agrifood practices. Second, this study reveals a novel dimension in the relationship between farmers' cooperatives and sustainable agrifood systems. While existing scholarship focused on how farmers' cooperatives can contribute to the development of sustainable agrifood systems, the analysis of our Chinese sample shows that in a mature capitalist agrifood system, pursuing sustainable alternatives is vital to the economic sustainability of farmers' cooperatives.

There are at least two notable limitations in this study. First, our sample size of successful authentic cooperatives remains small. Although this did not result from our lack of efforts but is rather a reflection of the widespread fraud and failure in the cooperative sector in China, a bigger sample can potentially add more diversity to the practices of alternative agrifood production and distribution by cooperatives and thus allow a fuller understanding of cooperatives' roles in alternative agrifood systems. This small sample size, however, does not weaken our causal argument about the vital importance of alternative agrifood practices to the economic success of cooperatives: our argument is equally based on the 67 fake or failed cases in the sample. Furthermore, our argument is also easily falsifiable: one single counter-example—an *authentic* cooperative in China that has achieved

sustained economic success *without* adopting alternative agrifood practices—would suffice. So far, however, neither our own research nor that in the broader literature has produced one.

Second, this study has not compared the performance of non-cooperative organizations—agribusinesses for example—that have also entered alternative agrifood systems with that of cooperatives. Although theoretically we have reason to believe that cooperatives as a governance scheme should outperform markets or hierarchies in alternative agrifood systems, this remains a hypothesis that awaits empirical confirmation in future research.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest.

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ENDNOTES

[1] Article 3, Farmers' Specialized Cooperatives Law of the People's Republic of China (https://www.gov.cn/jrzg/2006-10/31/content_429182.htm, accessed on 22 May 2024).

[2] See Hu et al., 2023 for a summary.

[3] We use "smallholder" here as a descriptive term to refer to small-scale, household-based farms that rely mainly on family labor. In a capitalist agriculture, this group is internally differentiated, with some employing non-family labor, while others having to engage in non-farm wage jobs to supplement their farming incomes. The majority of smallholders are petty commodity producers.

[4] Our intended sample size was bigger, but some of the cases that we drew from the official list could not even be located when we tried to visit them, attesting to the fact that many registered cooperatives in China were CINOs.

[5] As mentioned earlier, any random sampling based on some official registry of cooperatives will only produce samples consisting mostly of CINOs and are thus of little use for studying the success of authentic cooperatives.

[6] *Mu* is a traditional measure of area widely used in rural China. Fifteen *mu* equals one hectare.

[7] In theory, cooperatives can also play this role of upgrading smallholders' technological know-how and helping them shift to higher-value products in the conventional agrifood system. However, as large agribusinesses and state institutions dominate the development and dissemination of technological know-how in the conventional agrifood system, smallholders' cooperatives have not been able to compete with them.

[8] One *yuan* equals 0.14 US dollar as of May 2024.

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