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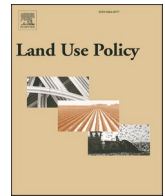
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# How does practice matches land laws in Central Asia?

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## ABSTRACT

This paper aims to explore the association between discrepancies in land rights and actual practices on the one hand and farmers' intentions to increase agricultural production on the other hand. We use farm-level data collected during a survey conducted in 2019 in southern Kazakhstan and eastern Uzbekistan and compare perceptions with land legislations of both countries. Comparative analysis of tenure conditions revealed that Kazakh farmers are less restricted in land use than Uzbek farmers. Moreover, insufficient law enforcement allows Kazakh farmers to violate existing restrictions on land transferability. Uzbek farmers tend to underuse their rights in such crucial issues as income generating and withdrawal of products from the land; the reason lies in inconsistency between land code and supplementary decrees for strategic crops. Our empirical findings show that mismatches between land rights on paper and perceived land rights – that might be the violation of law restrictions or incomplete use of land rights – generally reduces farmers' willingness to increase production.

## 1. Introduction

Land intensification that basically refers to the increased use of non-land inputs on a given plot plays an important role in improving global food security (Brookfield, 2001; Gustavsson et al., 2011). It comprises various farmers' actions (often investment consuming) such as the conversion of fallow land to permanent cropland, an increase in inputs, and adoption of improved technologies. Land intensification like any other farmers' decision is a complex process and requires preliminary actions such as problem detection, problem definition, analysis, development of intention, and implementation (Kay and Edwards, 1994; Öhlmer et al., 1998). Among these actions, individual intention is often used as a proxy for behaviour, although the implementation of this behaviour is not guaranteed. The complexity of the decision-making process and differences in institutional characteristics between developed and developing countries call for considering the role of institutional environments in farmers' decisions. Several studies have found that the degree of tenure security is one of the most important determinants in farmer's decisions on agricultural production and investment (Boserup, 1965; Holden and Otsuka, 2014; Lawry et al., 2014). However, contradicting evidence presented in empirical studies suggests that the effect of tenure security is not clear and dependent on the institutional environment (Brasselle et al., 2002; Newman et al., 2015). Besides, the lack of a common view on how to measure tenure security

hampers the generalization of the tenure security effect.

One of the pioneers who operationalize land rights as a security proxy was Timothy Besley (1995). He examined self-reported (*de facto*) transfer rights and found that improved rights facilitate land investment in Ghana. Later, Brasselle et al. (2002) extended the number of rights and included land use rights in their study. Twerefou et al. (2011) employed farmers' *de facto* land transactions (land selling, leasing, and transfer) to measure their effects on land investment. Land titles associated with the formalization of land rights often fail to provide evidence of tenure security (Ma et al., 2015a). Ayamga et al. (2016) propose that security may vary with land tenancy arrangements. Authors found that farmers without ownership rights are likely to invest less in land improvement. Much of the literature on land tenure security uses formal or informal institutional arrangements separately to analyse their impact on the performance of farming activity, but neglects the effect of their interactions. This gap leads us to investigate how the interaction between legal land rights and perceived land rights affects land intensification. Introducing a new approach to compare what is in "paper and practice", Klümper et al. (2018) assume that these paper-practice mismatches can lead to less investment in resource use; but authors do not provide corresponding empirical evidence.

In countries where a large share of agricultural land belongs to the government, the main problem is that land rights are either not clearly defined or land users lack a consistent understanding of them. This

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uncertainty impedes the formation of land markets and distorts production incentives, investments in land-improving measures, and effective allocation of land resources (Feder and Feeny, 1991; World Bank, 2007). That is what has happened to Kazakhstan and Uzbekistan, two transition economies that individualized agriculture after the dissolution of the Soviet Union but failed to provide secure land rights due to ambiguous formulations of land law and ineffective law enforcement (Melniková and Havrland, 2016; Hanson, 2017).

In this study, we explore whether discrepancies between land rights and actual practices are related to farmers' intention to increase agricultural production in Kazakhstan and Uzbekistan. The main contribution of our findings to the existing literature is that we use discrepancies between land rights written in national land codes and actual farming practices in empirical analysis for the first time. The remainder of this paper has the following structure: In the next section, we describe agricultural development and land tenure arrangements in Kazakhstan and Uzbekistan. Afterwards, we provide the conceptual framework of land rights and actual practices and their relevance to land intensification. Section 4 describes the methodology and data. Section 5 reports and discusses descriptive results on discrepancies between land rights and actual practices and empirical results of regression analysis. Section 6 summarizes the findings and draws policy implications for land administration in the focus countries.

## 2. Agricultural development and land tenure in Kazakhstan and Uzbekistan

Kazakhstan and Uzbekistan are two neighbouring countries located in Central Asia. Both have a mix of arid and semi-arid climate and more than half of their territories are used under agriculture. In Uzbekistan, crop cultivation is mainly irrigated which is determined by environmental conditions such as high soil salinity and a long and dry summer. Due to the vast territory, Kazakhstan's regions vary in environmental conditions. The northern part of Kazakhstan, where soil is relatively fertile, has rain-fed agriculture and the southern part is dominated by irrigated agriculture. While Uzbek people engaged traditionally mainly in sedentary farming, pastoral and nomadic Kazakh people were forced to sedentary farming during the Soviet era. However, the big part of agricultural land in Kazakhstan is still under pastures. The southern part of Kazakhstan together with Uzbekistan became a central component of cotton-growing region during the Soviet period (Petrick and Pomfret, 2016) and northern Kazakhstan became an important producer of wheat and barley. The production of predominant crops coming from the Soviet legacy remained after the collapse of the Soviet Union.

To eliminate inefficiencies of collective land management after the dissolution of the USSR, Kazakhstan and Uzbekistan have undergone salient structural changes in the agricultural sector, albeit with significant differences. Recuperating from the initial slump caused by the disintegration of the centrally planned system, the two countries implemented a set of reforms to build their own national agricultural sectors. Both of them followed a so-called conventional approach to land reforms implying a redistribution of land used by state and collective

enterprises to households and commercial farms (Lerman and Sedik, 2018). While Kazakhstan transferred, at least to some farms, ownership titles, Uzbekistan conserved state ownership of land (Melniková and Havrland, 2016). Dehkans and farmers<sup>1</sup> received only land use rights with long-term lease contracts.<sup>2</sup> Moreover, the Uzbek government preserved the Soviet system of state quotas and subsidies for cotton and wheat production, denying farmers the opportunity to adjust land use to the new market environment.

Kazakhstan went a bit further, undertaking the necessary measures to decentralize production and marketing processes and reducing the government's influence to a minimum. Land ownership rights were granted to households in 1991 and commercial farmers in 2003.<sup>3</sup> Kazakh farmers have been exposed to fewer state interventions and faced more market-driven incentives. Despite of political and economic reforms intending to establish a market economy, substantial structural changes (such as outmigration of rural population, disruptions in supply chains, removal of agricultural subsidies) resulted in a substantial decline in land use and agricultural production. According to the numbers reported by the Food and Agriculture Organization of the United Nations, about 20 million hectares of cropland in Kazakhstan were abandoned from 1991 to 1999 and only 6 million hectares were recultivated by 2018. Uzbekistan, in contrast, succeeded to avert a dramatic collapse in agricultural production and removed only 800 thousand hectares of sown area in the first decade of independence, of which 300 thousand were recultivated again in the next two decades.

Land reallocation resulted in an increase in the share of individual farms in agricultural production (Lerman and Sedik, 2018). Between 1991 and 2010, the contribution of individual farms to Gross Agricultural Output raised from 32 to 71 per cent in Kazakhstan and from 33 to 98 per cent in Uzbekistan. The cropland productivity of newly established individual farms was not significantly different from cropland productivity of agricultural enterprises at the beginning of 1990 s (Fig. 1); yet, after 2005, individual producers outperformed corporate farms and continued to enlarge the disparity. Despite the considerable contribution of individual farms to the agricultural sector, they still faced constraints inhibiting their incentives.

The land reform process aiming at better tenure arrangements remained incomplete in Kazakhstan. Inadequate institutional capacity, high transaction costs of land exchange, skewness of land distribution towards large-scale producers left land market inactive (Kvartiuk and Petrick, 2021). As a result, Kazakh farmers still prefer to rent state land paying low fees instead of acquiring private ownership.<sup>4</sup> Moreover, prioritized crops were still produced by enterprises that dominated in sub-sectors. In February 2013, Kazakhstan adopted a new programme

<sup>1</sup> In Uzbekistan, the term dehqan farm designates a small-scale household farm and farmer is a land user with larger farm size relying on hired labour.

<sup>2</sup> According to the Land Law of Uzbekistan (1998), the duration of lease contract can be up to 50 years, but not less than 30 years; "leased land parcels cannot be objects of sell - buy, mortgage, present, exchange. The right to lease the land parcel can be passed as a mortgage for getting credits. The lessee has the right to pass his lease rights to the land parcel as a mortgage without the consent of the lease-giver only in cases envisaged by Law or the lease agreement." However, with amendments to the Land Code introduced on 29.09.2020, commercial farmers may sublease their plots up to one year for agricultural purposes. The lessee has a primary right to renew the land lease contract after its expiry.

<sup>3</sup> In Kazakhstan, households are small-scale land users that mostly engage in labour-intensive and livestock production to meet their own consumption needs on land located in rural and suburban areas. Commercial farms are agricultural producers that operate in the form of individual, family, or corporate farms. Generally, these farms are larger and market most of their production.

<sup>4</sup> According to Kazakh Land Code (2003), farmers may lease land for up to 49 years without the rights to sell or lease. However, they have a priority to renew a lease contract or purchase the land. The mortgage of agricultural land is illegal for leaseholders.

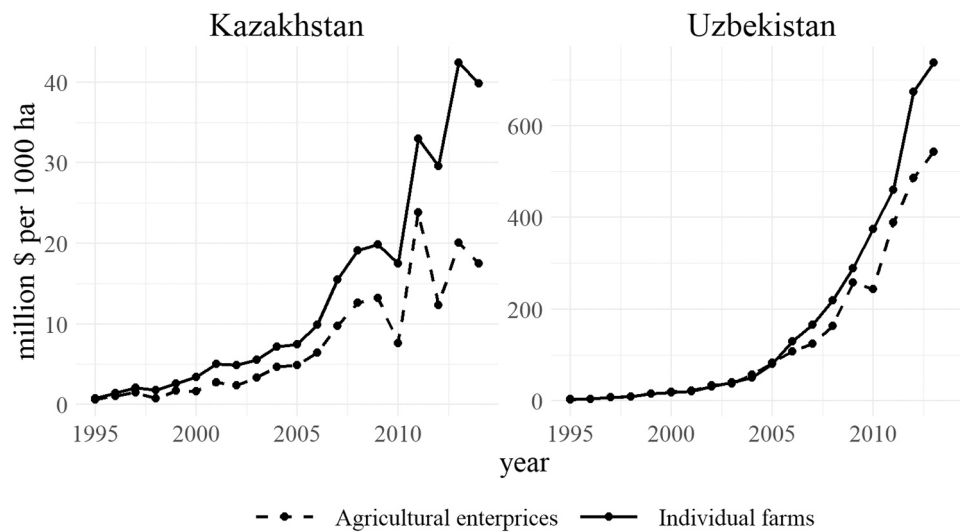


Fig. 1. Productivity of individual farms and agricultural enterprises (1995–2014). Compiled by authors using data from statistical yearbooks and Penn World Table (9.0).

“Agribusiness 2020”, the main objectives of it were boosting agricultural production and enhancing the competitiveness of local producers through specific measures, such as improving the effectiveness of state regulation, the financial rehabilitation of agricultural sectors, and the removal of bureaucratic barriers (Agribusiness-2020, 2012). However, international and local experts have expressed their concerns about the effectiveness of government support, because farmers needed not only eased access to inputs and capital but also the freedom to discover productive market opportunities and trust to institutions. Therefore, they highlighted the need to give more attention to the institutional and regulatory framework that would enable market mechanisms to allocate resources effectively (Petrick and Pomfret, 2016; Oshakbayev et al., 2018).

Uzbekistan has undertaken several agricultural reforms aiming at dismantling large-scale farms: farm reorganization in 1992 and farm fragmentation in 1998 (Djanibekov et al., 2012). The farm restructuring, however, neglected the fact that the irrigation water supply system was designed to serve large scale farms during the Soviet period. Excessive fragmentation of fields resulted in delays of water supply that, consequently, led to disruptions in agricultural production. The state initiated a new wave of farm consolidation in 2008 to readjust farm sizes that would be suitable for the existing irrigation system. Farmers with less than 30 ha returned their lands on an involuntary basis without receiving any compensation (Melniková and Havrland, 2016). Cotton and wheat production that occupies more than 80 per cent of the sown area and remains under the state order system is subject to another consolidation reform since 2018 (Zorya et al., 2019). All of these reforms seek to enhance productivity, but such frequent farm reorganizations have undermined farmers’ management and investment incentives increasing land tenure insecurity among farmers (Mukhamedova and Pomfret, 2019).

Implementation of land reforms in Kazakhstan and Uzbekistan is inextricably linked to the level of law enforcement. If land legislation is not sufficiently enforced and does not involve adequate monitoring and punishment for law violations, the assurance of rights is low (Sjaastad and Bromley, 2000). Poor detection of violations and the low severity of punishment increase the incentive to break rules that, in turn, leads to increase in tenure insecurity.

Kazakhstan and Uzbekistan impose different levels of law enforcement on land users. Given that agriculture is the most centralized sector in Uzbekistan, the government strictly controls the majority of agricultural activities including input and output allocation, and enforces all relevant state decisions. Particularly, cotton and wheat producers risk to

be subject to administrative and criminal liability and to lose their land if they fail to fulfil mandatory targets (Muradov and Ilkhamov, 2014).

In Kazakhstan, where agriculture has the lowest share in the Gross Domestic Product, the overall economic system is closer to a market economy than in Uzbekistan, but the ability of state structures to enforce effective economic policies remains weak (Satpayev, 2014; World Bank, 2018). Due to the inconsistency between central and local governments, the implementation of approved state programs often does not start or remains incomplete at the regional level. Local government bodies can disregard national legislation and state orders in the pursuit of self-interest or the interest of local elites. The lack of law enforcement, hence, is a result of perpetual competition between different government levels for the redistribution of administrative power, and ineffective mechanism for inspection and criminal prosecution. Such low quality of institutions and incomplete land markets push farmers to respond with risk-reducing activities. Therefore, we assume that law enforcement is strongly associated with the perception of land rights by farmers.

### 3. Conceptual framework

#### 3.1. Bundles of land rights and actual practices

Providing tenure security is important for creating incentives for investing in land. When governments fail to establish secure tenure conditions, farmers tend to sacrifice future returns to protect themselves against adverse income shocks by using inputs less intensively (Morduch, 1995). Empirical studies have confirmed the positive association between tenure security and production decisions (Feder et al., 1988; Besley, 1995; Ma et al., 2017); however, there are still debates on what is mentioned by the term ‘tenure security’.

Sjaastad and Bromley (2000) distinguished two concepts regarding land tenure: substance of rights referring to the content of land rights and assurance of rights referring to uncertainty of rights. The content of the bundle of rights is included in a land title and defines the privileges to use a given plot to one user and assign duties on others to stay off this land. Moreover, access to credits and the activity of land markets depends on the substance of land rights.

Scott (2008) identifies “three powers” given by land rights: the power to use and manage land, the power to transfer and alienate it, and the power to take income or rent from land use. In a similar but more detailed approach, Schlager and Ostrom (1992) propose to split property rights into two groups: operational-level rights, which enable

individuals to access land and withdraw the land's products, and collective-choice level rights, which grant authority to elaborate operational-level rights. They developed a conceptual scheme to distinguish five independent bundles of rights (access, withdrawal, management, exclusion, and alienation). Pooling together these classifications, Klümper et al. (2018) use three main bundles of land rights to analyse households' tenure conditions in Tajikistan; each of the main bundles contains case-dependent rights that can be combined under a common characteristic:

- 1) Land use rights include access, withdrawal, and land use change rights.
- 2) Control and decision-making rights include management, investment, exclusion, and income-generating rights.
- 3) Alienation rights include reallocation, sell, leasing, and inheritance rights.

Some scholars claim that the right to tenure security and government protection is attached to land title and granted by the authority issuing official land titles (Place, 2009; Ma et al., 2017). Others see the security as a separate full-fledged right in the joint bundle of tenure rights. In the seminal work of Honore (1961), the right to security has a place in the list of the eleven "incidents of ownership". Following several studies that attempt to revisit and improve the Schlager-Ostrom framework (Galik and Jagger, 2015; Sikor et al., 2017; Klümper et al., 2018), we add the bundle of government protection that consists of the protection of tenure rights by courts and the power of land certificates. The right to protection by courts allows farmers to protect own interests in courts in disputes with other farmers, foreign investors, or local authorities. The power of land certificates helps farmers to confirm land rights documentally. Land certificates should give security to the holder by default, but the farmer's perception of certificate validity can differ completely from what is originally conceived. This may be a consequence of the insufficient implementation of land regulations at the local or regional level, or of the farmers' mistrust in the administration and government to uphold and protect their rights. Table 1 presents the four bundles of rights used in this study.

Sjaastad and Bromley (2000) insist that assurance of rights is sufficient for the concept of tenure security that, in turn, can be defined as the perception of the likelihood of losing a specific land right. Ma et al.

**Table 1**  
Bundles of land rights and descriptions.

Bundles	Rights	Description
Land Use	Access	Right to enter a defined physical plot
	Withdrawal	Right to obtain the benefits from land
	Land use change	Right to change the type of agricultural activity
Control and decision-making	Management	Right to control internal use patterns and transform the land by making improvements
	Investment	Right to invest in land melioration and irrigation systems
	Exclusion	Right to define who has access to the land
	Income generating	Right to earn income from the land
Alienation	Reallocation	Right to sell or lease the right of management and/or the right of exclusion
	Sell	Right to sell the land
	Leasing	Right to rent out the land
Government protection	Inheritance	Right to inherit the land
	Protection by courts	Right to government protection by courts
	Power of land certificates	Right to have legally valid land certificates

Note: definitions were compiled from Schlager and Ostrom (1992), Meinzen-Dick (2014), Klümper et al. (2018).

(2017) reckon that it is perceptions of land rights, not land certification or laws, that impact directly on land users' decisions.<sup>5</sup> Perceptions affect decisions about land use and result in the actual implementation of land rights that can be inconsistent with the law (Deininger, 2003). Therefore, land use patterns are determined not only by legal rights (LR) but also by actual practices (Ellickson, 1986; Klümper et al., 2018). Actual land use practices are shaped not only by perceptions of land rights but also by perceptions of informal institutions such as customary rules or commonly accepted practices (Prell et al., 2010).

Commonly accepted practices can be a result of either traditional farming practices or the inability of farmers to adapt to socio-economic and political transformations, such as transition from plan to market economy or technology shocks, and to adjust their farming practices creating new combinations of formal and informal institutions (Ward and Kingdon, 1995; Chavance, 2008). For instance, in some former Soviet countries that had no recognition of private land ownership during the collectivization period, farmers faced challenges after decollectivisation due to the absence of the skills and farming practices necessary for private farming (Rozelle and Swinnen, 2009). Therefore, they might not be eager to acquire land ownership. In the context of this study, we use the term 'actual practices' (AP) to cover informal rules and informal farming practices (e.g., illegal subleasing or land reallocation) emerging with decollectivisation and land reforms.<sup>6</sup>

### 3.2. Land use and discrepancies between land rights and actual practices

Legal rights and actual practices may support (LR=AP) or contradict each other (LR≠AP) (Klümper et al., 2018). Farming practices supported by the relevant property right bear fewer risks for farmers and create a secure environment for land use. Contradicting LR-AP combinations could be two-folded. The first contradiction appears in situations when legal rights are more pronounced than actual practices (LR>AP) and might be a result of farmer's unawareness about land rights or low exploitation of these rights by farmers. The second contradiction appears in situations when actual practices exceed the relevant rights (AP>LR), which implies that farmers violate legal restrictions, ignoring the authority of local administration and the rule of law. That might be the case when non-compliance is not sanctioned by effective governance mechanisms and actual land tenure practices are likely to fill gaps of the legal system. This type of mismatches also indicates weak institutions with insufficient law enforcement and a lack of trust in government (Broegaard, 2005).

The relationship between LR-AP discrepancies and land users' decisions has not been examined empirically in extant literature. Following the claims by Klümper et al. (2018) about the relationship between non-compliant behaviour and insecurity, three scenarios can be identified which would imply different incentives for a farmer's intention to intensify land use:

<sup>5</sup> Perception of tenure security has been increasingly used in addition to substance-based measurements not only in regional empirical studies. Considering the importance of perceived tenure security, international organizations also gather corresponding indicators to monitor true tenure security across countries. For example, the Sustainable Development Goals indicator framework adopted by United Nations developed Indicator 1.4.2 that incorporates perception of "tenure rights as legally secure, regardless of whether these rights are documented." Another example is the Prindex program, initiated by Global Land Alliance and the Overseas Development Institute that launched a global survey on perceived tenure security.

<sup>6</sup> We avoid to use the term "customary" rules that is often mentioned in studies that focus on the African countries (Mwangi and Meinzen-Dick, 2009; Meinzen-Dick, 2014; Holden and Ghebru, 2016). The reason is that it is not relevant in the context of Central Asia because crop cultivation does not arise from the community's traditions over a long period or the use of land by ancestral societies.



- 1) Actual practices are fully aligned with the formal legal framework (LR=AP). We use this as default scenario.
- 2) Actual practices might not fully exploit the opportunities offered by the legal framework (LR>AP). Although we cannot conclude whether a farmer doesn't use opportunities out of free decision or due to conflicting agricultural policy instruments such as the Uzbek procurement policy, we hypothesize that this farmer's intention to intensify will be lower as in the default scenario.
- 3) Actual practices might exceed the legally provided opportunities (AP>LR). By definition, formal land laws must imply certain restrictions of a respective right in order to result in such a discrepancy. Conditional upon a farmer's awareness of this non-compliant behavior, her/ his intention to intensify land use might be higher (unaware of legal rights) or lower (aware on non-compliance) than in the default scenario. In the first case, a farmer might expect to possess more rights than foreseen in the land code and might assume to reap the benefits of an intensified land use. In the latter case, the farmer is assumed to be aware of the risk of punishment, e.g. losing rights or future benefits from land. Therefore, farmers' incentives to intensify land use is expected to be less than in the default scenario.

However, two reasons prevent the development of hypotheses involving a causal relationship between discrepancies and the intention to intensify land use. First, as some studies provide evidence of high perceived tenure security even in the absence of formally established property rights (UNHR, 2015; Rao et al., 2017), the extent of law enforcement represents an important contextual variable.

Second, both perceptions, of actual practices and intensification, are not formed independently from each other. Thus, any assumption of a causal relationship will be impossible to be falsified econometrically. This study provides only additional insights on how far farmers' perceptions about land rights deviate within groups with different tenure settings. Therefore, the further analysis carries only an explorative character.

#### 4. Methodology and data

##### 4.1. Study area and sample selection

We use data from a farm survey<sup>7</sup> conducted in March and April 2019 in two different neighbouring regions with irrigated agriculture: Turkistan province in southern Kazakhstan, and Samarkand province in eastern Uzbekistan. Three districts were chosen from each province to select respondents. In Uzbekistan, 460 farms – that constitute 30 per cent of the farm population – were selected randomly from 1525 eligible farms<sup>8</sup> in Pastdargom, Payarik, and Jomboy districts. A two-step sampling approach was applied in Kazakhstan. As Kazakhstan's three districts – Maktaaral, Shardara, and Sariagash – have 31 sub-districts, three sub-districts were chosen randomly in each district. Further, in each sub-district, around 50 farms were selected randomly resulting in 495 farms in total, representing 2 per cent of all farms in three districts.

Fig. 1A in the Appendix demonstrates aggregated land area used by farmers interviewed in the survey. The land is grouped by tenure conditions in two study regions. Uzbek respondents rent state land that constitutes 17914 ha or 4 per cent of the total sown area in Samarkand province. The area farmed by respondents in Kazakhstan sums up to 6485 ha which constitutes 0.8 per cent of the total sown area in Turkistan province. Of 6485 ha, 55 per cent is under private ownership, 30 per cent is rented state land, and 15 per cent is rented land from other

farmers.

##### 4.2. Description of variables of interest

###### 4.2.1. Intention to increase production

Intention and its relation to behaviour have been investigated by various studies. The Theory of Reasoned Actions and its extension, the Theory of Planned Behaviour (TPB), propose a useful framework to understand farmers' behaviour based on their perceptions and beliefs (Ajzen and Fishbein, 1980; Ajzen, 1991). These theories suggest that the most proximal predictor of behaviour is intention. Lefebvre et al. (2014) investigated farmers' intention to invest in land and found that the majority of farmers (74 per cent) demonstrate behaviours consistent with their intentions. According to Viira et al. (2014), farmers' intentions predict effectively actual behaviour when the considered action is positive (farm growth) rather than negative (farm shrinkage). Given these aspects and that the value of agricultural intensification is not observed directly in this study, we use farmers' intentions to increase production as a proxy for land intensification.

To collect data on intentions, farmers responded to the question: "How likely is it that you will increase crop yield in at least part of your farm in the next year?" The variable is ordinal and measured on a five-point Likert scale anchored with 1 = *Extremely Unlikely* and 5 = *Extremely Likely*. Fig. 2A in the Appendix demonstrates that the patterns of responses are similar in both regions. The distributions of responses are skewed to the left, indicating that most of the farmers have positive attitudes towards increasing production. The willingness to gain higher output can be characterized as a socially acceptable option; therefore, one might doubt the validity of responses due to social desirability bias (Nederhof, 1985). To reduce the bias as much as possible, interviewers notified farmers that there was no right or wrong answer, and the data collected would be treated confidentially and in aggregated form. The Likert scales were placed at the beginning of the questionnaire to reduce bias from participant fatigue. All respondents and interviewers were men that excludes the risk of gender-related bias.

We examine the convergent validity of this variable with two additional variables that also measure the willingness to intensify land use on the five-point Likert scale.<sup>9</sup> These questions were formulated following the procedures for constructing the TPB questionnaire recommended by Fishbein and Ajzen (2010). Using multiple items to measure a single concept allows covering different aspects of the concept and reducing the measurement error that can originate from poor wording or misunderstanding of the scaling approach (Hair et al., 2017). The average variance extracted, a criterion of convergent validity that refers to the degree to which measures are related, is 0.544 that is above the conventional threshold of 0.5. The Cronbach's  $\alpha$  of three variables is 0.78 (recommended threshold is 0.7) and indicates a high internal consistency.

###### 4.2.2. Operationalization of land rights, actual practices and their discrepancies

We use a methodological approach applied by Klümper et al. (2018) to operationalize land rights and actual practices in order to calculate discrepancies between them. Table 2 presents four bundles of rights as well as the coding of legal rights and responses to questions covering actual practices. The results of pre-survey explorative interviews revealed that farmers do not intend to rent their land out due to land scarcity, but instead, many would like to lease more land. Therefore, we split the lease right into two, the right to rent out and the right to rent from farmers who lease state land (land tenants), to mirror the actions of

<sup>7</sup> The Agrichange II survey has been financed by Volkswagen Foundation, German Ministry of Education and Research (BMBF), and IAMO.

<sup>8</sup> Eligible farms in this study are legally registered farms that produce mainly crops, have at least 80% of irrigated land, and were active in farming in 2019. Respondents were chosen from the list at regular intervals.

<sup>9</sup> For two additional variables, we used the following statements: "Do you plan to increase crop yield in at least part of your farm in the next year?" and "How strong is your intention to increase crop yield in at least part of your farm in the next year?"

**Table 2**  
The operationalization of land rights and land-use practices.

Bundles	Right/Practice	Legal rights	Actual practices
Land use	Access	1-no right;	1-Never hold the practice;
	Withdrawal		
	Land use change		
Control and decisions	Management	3-limited right;	2-rarely hold;
	Investment		
	Exclusion		
	Income generating		
Alienation	Reallocation	5-full right.	3-occasionally;
	Sell		
	Renting out		
	Leasing from land tenants		
Government protection	Inheritance	5-always.	4-very frequently;
	Protection by courts		
	Power of land certificates		

the latter ones and to identify if they violate legal restrictions.

The operationalization implies converting the land rights and the perception of these rights (actual practices) by farmers into measurable factors. To analyse actual practices, we use survey data that encompasses farmers' self-assessment of their land rights. A 5-point ascending scale (see Table 2 column 4) was offered after each question formulated as: "To what extent are you free to use the right to access, withdraw from land, etc.?"

Legal land rights were assessed on the basis of the Kazakh and Uzbek national land codes. To assign a score to land rights, we used the same 5-point scale but points 2 and 4 were intentionally omitted to avoid difficulties in assessing legal restrictions in land use. Instead of classifying limitations into three levels (low, medium, and high), we introduced one medium level. Score 1 was assigned in case if a right is completely prohibited by law, score 3 was given to rights with partial restrictions, and score 5 was assigned to full rights.

We identified three categories of farmers who participated in the survey and have different legal privileges and limitations in land use: (1) Uzbek land tenants, (2) Kazakh landowners, and (3) Kazakh land tenants. The assessment of their land rights and the respective articles in the national land codes are presented in Table 3. As the results show Kazakh farmers with private farmland (left bar chart) should have the highest amount of fully transferred land rights among three groups as indicated by a score of 12 out of 14. The two exceptions are the limited right to land use change and the right to lease from farmers with rented state land. Kazakh farmers who rent state land (middle column) face more legal restrictions than those who own land. Particularly, all rights in the alienation bundle, except for the inheritance right, are completely restricted. Finally, Uzbek farmers (right column), the most deprived group in terms of legal land rights, do not have any right in the bundle of alienation rights and the right to land use change. Besides, their management right and the right to invest in land improvements are limited. Before undertaking any change in land management or investing in land improvements, Uzbek farmers are obliged to obtain permission from the local authorities. Later on, these changes have to be carried out under the control of respective institutions.

The presence of written land law and official land titles implies that the legitimacy of these documents is fully backed by authorities who issued them. Therefore, two rights in the government protection bundle (the right to government protection in courts and the certificates' importance) are assigned the score 5 for all three groups.

After the quantitative assessment of land rights and actual practices, we calculate their discrepancies using the following equation:

$$Discrepancy = Land\ Right - Actual\ Practice \quad (1)$$

The scale of discrete discrepancy values may range from -4 to 4,

**Table 3**  
Evaluation of legal land rights and the corresponding articles in land codes.

Rights	Kazakh farmers				Uzbek farmers	
	Landowners		Land tenants		Land tenants	
	Value	Articles	Value	Articles	Value	Articles
Access	5	23(2)	5	12(17), 37(1)	5	17, 39, 46, 49
Withdrawal	5	25(1)	5	64(1/2)	5	39
Land use change	3	65(4), 97(3-2), 98	3	65(4), 97(3-2), 98	1	43, 49
Management	5	25(1), 42(2), 64(1/1)	5	42(2), 64(1-1)	3	12
Investment	5	65(1/2.9), 25(1)	5	65(1/2, 1/9)	3	13, 40
Exclusion	5	164	5	33(1), 65(1/8), 164-1(1)	5	53
Income generating	5	64(1/2), 25(1)	5	64(1/2)	5	39
Reallocation	5	25(2)	1	33(2)	1	53
Sell	5	25(2)	1	33(2)	1	53
Renting out	5	25(3)	1	33(2), 38(5)	1	53
Leasing from land tenants	1	33(2), 38(5)	1	33(2), 38(5)	1	52
Inheritance	5	40	5	40	1	17, 19
Protection by courts	5	5, 164	5	5, 29(2), 32(1), 35(4, 5), 64(1.4), 164	5	41, 83, 85, 89
Power of land certificates	5	12(24), 43(10), 97(7), 171	5	12(24), 43(10), 97(7), 171	5	20, 33, 35

Source: Own assessment based on the Land codes of Kazakhstan (2003) and Uzbekistan (1998)

Note: The survey was conducted in 2019; therefore, the assessment does not include amendments in Uzbek land code introduced in 2020.

where negative values certify a potential law violation, i.e. rights overuse. Positive values show the underuse of right and appear when the farmer responds not to have the right to the allowed extent; in other words, the farmer feels restricted to perform an activity regulated by law (due to insufficient knowledge, controversial regulations, arbitrariness of local officials, etc.). The absence of discrepancy, 0, means that land rights perfectly overlap with actual practices.

Table 4 provides details on the discrepancies between land rights and actual practices for Kazakh and Uzbek farmers. Overall, 21 different discrepancies were retrieved from comparing the legal assessment and survey respondents' statements. As can be seen from the table, the list of discrepancies differs for Kazakh and Uzbek farmers, in some cases even to a large extent. For ease of understanding, descriptive statistics of positive and negative discrepancies are displayed separately; the mean and standard deviation of discrepancies are calculated for different subsamples the size of which depends on the number of farmers with negative or positive discrepancies. Considering that the range of each discrepancy is four at maximum, the standard deviation in discrepancies in the alienation bundle is quite high for Kazakh farmers, more than one. Uzbek farmers show high variation in discrepancies for the rights to withdrawal, exclusion, and income generating.

#### 4.2.3. Additional explanatory variables

Control variables included in the empirical analysis comprise farm and farmer characteristics. Farmer-specific variables incorporate educational level, age, special agricultural education, use of consultancy services, and the desired period of land use in the future. These factors

**Table 4**  
Descriptive statistics of discrepancies.

	Rights	Discrepancy	Kazakhstan		Uzbekistan	
			Mean	Std. Dev.	Mean	Std. Dev.
1	Access	positive	0.11	0.37	0.08	0.43
2	Withdrawal	positive	0.29	0.56	2.50	1.54
3	Land use change	positive	0.08	0.36		
4		negative	-1.66	0.63	-0.47	0.93
5	Management	positive	0.26	0.54	0.28	0.49
6		negative			-0.20	0.45
7	Investment	positive	0.33	0.68	0.13	0.49
8		negative			-1.43	0.73
9	Exclusion	positive	0.47	1.03	0.47	1.15
10	Income generating	positive	0.27	0.58	3.43	0.96
11	Reallocation	positive	0.67	1.33		
12		negative	-0.49	1.14	-0.34	0.69
13	Sell	positive	0.54	1.26		
14		negative	-0.55	1.31	0.00	0.07
15	Renting out	positive	0.47	1.10		
16		negative	-0.66	1.36	-0.27	0.54
17	Lease from land tenants	negative	-2.84	1.48	-0.18	0.50
18	Inheritance	positive	0.12	1.18		
19		negative			-0.14	0.42
20	Protection by courts	positive	1.43	0.93	1.93	0.65
21	Power of land certificates	positive	0.39	0.85	0.82	0.87

are expected to affect the farmers' decisions; however, the signs of their impacts are ambiguous across microeconomic studies on land use (Ma et al., 2015b; Qu et al., 2018). Farm-specific variables that may affect productivity or cost of cultivating include farm size, distance to the nearest market, soil fertility, salinity, and irrigation conditions. Economies of scale would predict declining costs per ha; however, supervision and other costs might increase with increasing farm size. Distance to the nearest market is expected to have a negative effect on farmers' decisions, as an increasing remoteness might result in lower farm gate prices, land investment, and input use. The latter three agroecological attributes of farmland provide approximate evaluations by farmers and do not constitute actual physical measures. Land fertility and irrigation conditions are expected to impact positively on the production increase, while soil salinity is expected to impact negatively. Finally, we introduced a dummy variable for Uzbekistan to control for unobserved country differences. In view of such determinants as irrigation infrastructure, water availability, access to production inputs and local organisations, village dummy variables may give more adequate results to capture village-level variation, but this cannot be done due to the lack of the respective data. The list of additional explanatory variables with descriptions is presented in Table 5.

4.3. Model specification and estimation strategy

To test the relationship between farmers' intention to increase production and LR-AP discrepancies, we follow the approach of previous studies (Brasselle et al., 2002; Twerefou et al., 2011). Intention can be expressed as a function of a vector of explanatory variables,  $X_i$ , among which institutional indicators are of our interest:

$$I_i^* = \beta' X_i + u_i, \quad u_i \sim N(0, 1) \tag{2}$$

where  $\beta'$  is a vector of unknown parameters. The dependent variable,  $I_i^*$ , is latent and consists of the different likelihood levels of production increase, as revealed by the responses, identified by the  $i^{th}$  farmer. An observable variable  $I_i$  that is a collapsed version of  $I_i^*$  is ordinal and depends on various threshold points of  $I_i^*$ .

Several studies have indicated that land rights are endogenous due to simultaneity or reverse causality from land improvements to tenure

**Table 5**  
Definitions of additional explanatory variables.

Variable	Description	Mean	SD
<i>Farmer characteristics</i>			
<b>Educational level</b>	Level of last completed education degree: from 1 =no education to 8 =university	5.6	1.7
<b>Age</b>	Age of farmer in years	44.5	11.9
<b>Special agricultural education</b>	Dummy variable for special education: 1 =have; 0 =otherwise	0.3	
<b>Consultancy services</b>	Dummy variable for using consulting services: 1 =have; 0 =otherwise	0.1	
<b>Desired period</b>	Number of years a farmer desires to use his land:1 =up to 3 years, 2 =up to 5 years, 3 =up to 10 years, 4 =more than 10 years	3.7	0.7
<i>Farmland characteristics</i>			
<b>Farm size</b>	Total land area (ha)	25.4	28.2
<b>Distance to market</b>	Average distance between farm and the nearest market	15.1	10.9
<b>Soil fertility</b>	Weighted average of soil fertility evaluation: 1 =not good for cultivation, 2 =good for 1 crop per year, 3 =good for 2 crops per year, 4 =good for > 2 crops per year	2.6	0.6
<b>Salinity</b>	Weighted average of soil salinity evaluation: 1 =non-saline, 2 =low saline, 3 =medium saline, 4 =high saline.	2.1	1.1
<b>Irrigation conditions</b>	Conditions of irrigation and drainage network: 1 =bad, 2 =satisfying, 3 =good	2.1	0.7
<i>Regional characteristics</i>			
<b>Uzbekistan</b>	Dummy variable for Uzbekistan:1 =farmer resides in Uzbekistan; 0 = otherwise		

security (Besley, 1995; Brasselle et al., 2002; Twerefou et al., 2011). For this reason, it would be crucial to control for omitted variables, which drive perceived security or discrepancies and willingness to gain higher output at the same time. To capture the potential distortion from endogeneity in our estimates, we use the two-step conditional maximum likelihood (2SCML) approach proposed by Rivers and Vuong (1988). The reason for using 2SCML is that the dependent variable and our focus endogenous variables are discrete. The conventional two-stage least squares model would yield biased estimators under these conditions (Brasselle et al., 2002). Initially, the 2SCML procedure was developed for binary probit regression; however, it has proven to deal with ordered probit as well (Dow, 2008).

The first stage of 2SCML includes the estimation of a linear probability regression for the discrete endogenous variable by using instrumental variables to generate the estimated vector of residuals. The second stage involves the estimation of ordinal probit maximum likelihood by adding the vector of residuals from the first stage. Coefficients of the first stage residuals can be used to test the endogeneity of corresponding variables (Rivers and Vuong, 1988).

Finding appropriate instrumental variables for LR-AP discrepancies is a complicated issue. To overcome this problem, we used a heteroscedasticity-based instrumental method proposed by Lewbel (2012) that allows constructing instruments in the absence of traditional identification. The traditional way to obtain identification is to find instruments satisfying the exclusion restriction that implies no direct effects of the instruments on the dependent variable in the second-stage regression. However, there are cases when no instrument is excluded, or when validation studies are not available. The principle of Lewbel's<sup>10</sup> is that constructing valid instruments for an endogenous variable can be achieved by exploiting heteroscedasticity in the first stage model of the Lewbel's. Normally, this approach has four stages, each of which is calculated using an ordinary least squares estimator. Since our dependent variable and potentially endogenous variables are ordinal, we use

<sup>10</sup> Following Rao et al. (2017), we use the term "the Lewbel's" for a heteroscedasticity-based estimator.



the first three stages from the Lewbel's to construct instruments; then we proceed with the second stage of 2SCML. Similar procedures were applied by Rao et al. (2017) with binary probit maximum likelihood in the second stage of 2SCML. In particular, our estimation approach involves the following steps:

Step (1): In line with the Lewbel's procedures, we run the linear probability regression for each of 21 discrepancy variables ( $Discrepancy_j$ ) on a vector of exogenous variables ( $X$ ) that are control variables in our study:

$$Discrepancy_j = \beta_{0,j} + \sum \beta_j X + res1_{disc,j} \quad \text{for } j = 1...21 \quad (3)$$

Step (2): To generate instruments, exogenous variables were standardized ( $X^z$ ) and multiplied with residuals from Eq. (3), ( $X^z \cdot res1_{disc,j}$ ). Thus, we obtained 21 sets of constructed instruments for each of the discrepancies.

Step (3): We performed the first stage of 2SCML for each of the discrepancies by plugging generated instrumental variables into linear probability regression and computed the respective residuals,  $res2_{disc,j}$ :

$$Discrepancy_j = \beta_{0,j} + \sum \beta_{1,j} X^z \cdot res1_{disc,j} + \sum \beta_{2,j} X + res2_{disc,j} \quad \text{for } j = 1...21 \quad (4)$$

Step (4): Residuals from Eq. (4) were added to the second stage of 2SCML, Eq. (5). Finally, we used the ordered probit model to regress farmers' intention ( $I_k$ ) to the vector of original endogenous ( $Discrepancy$ ) and exogenous ( $X$ ) variables and the vector of residuals ( $res2_{disc}$ ) corresponding to each of endogenous variables.

$$I_k = \beta_{0k} + \sum \beta_{1,k} \cdot Discrepancy + \sum \beta_{2,k} X + \sum \beta_{3,k} \cdot res2_{disc} + \varepsilon_k \quad (5)$$

In Eq. (5),  $k$  varies from 1 to 4, because we run four regressions for each of the bundles of the LR-AP discrepancies. Due to the presence of heteroscedasticity, we used robust standard errors to adjust the estimate of the variance-covariance matrix of residuals in the final step.

## 5. Results and discussion

### 5.1. Comparison of discrepancies between land rights and actual tenure practices

Data on actual practices collected during the survey was used to estimate their discrepancies with legal rights (see Table 1A in the Appendix for descriptive statistics of AP and discrepancies by tenure types). We summarize results in Fig. 2 that demonstrates the shares of null, positive, and negative discrepancies for land users with different sets of land rights. Abbreviations in the figure stand for full legal right (FR), limited legal right (LLR), and no legal right (NR) for each component of the bundle of rights. Kazakh landowners represent the most beneficial group in terms of no-discrepancies. Kazakh land tenants produce the least congruent results among the three groups, although Uzbek farmers have more restricted land rights. The right to land use change and the right to lease land from other farmers who rent state land are of special interest. For both categories of Kazakh farmers, the extremely high share of negative discrepancies, about 90 per cent of the corresponding samples, indicates that farmers practice land transfer which they are formally not allowed to. The land code prohibits changing the designation and the use provision of a certain agricultural plot. This situation indicates a weak enforcement of land law and the efforts of Kazakh farmers to maximize land value by transferring land to more effective users, even at the cost of tenure security for those who initiates the transfer (land can be withdrawn by government).

Uzbek farmers, who have limited right to make any investment in land improvement independently, show that this limitation is being often violated. However, most of them uphold prohibitions in land alienation and leasing from other farmers. The interesting point is that Uzbek farmers heavily underuse the right to withdrawal and income generating. The reason for this is that most of the Uzbek respondents are cotton and wheat producers who follow state orders in production and mandatory sales plan.

All three categories have a similar pattern for discrepancies in the government protection bundle. Most of the farmers perceive less government protection of their rights in courts than postulated by law. To assess the actual practice of government protection, we estimate the

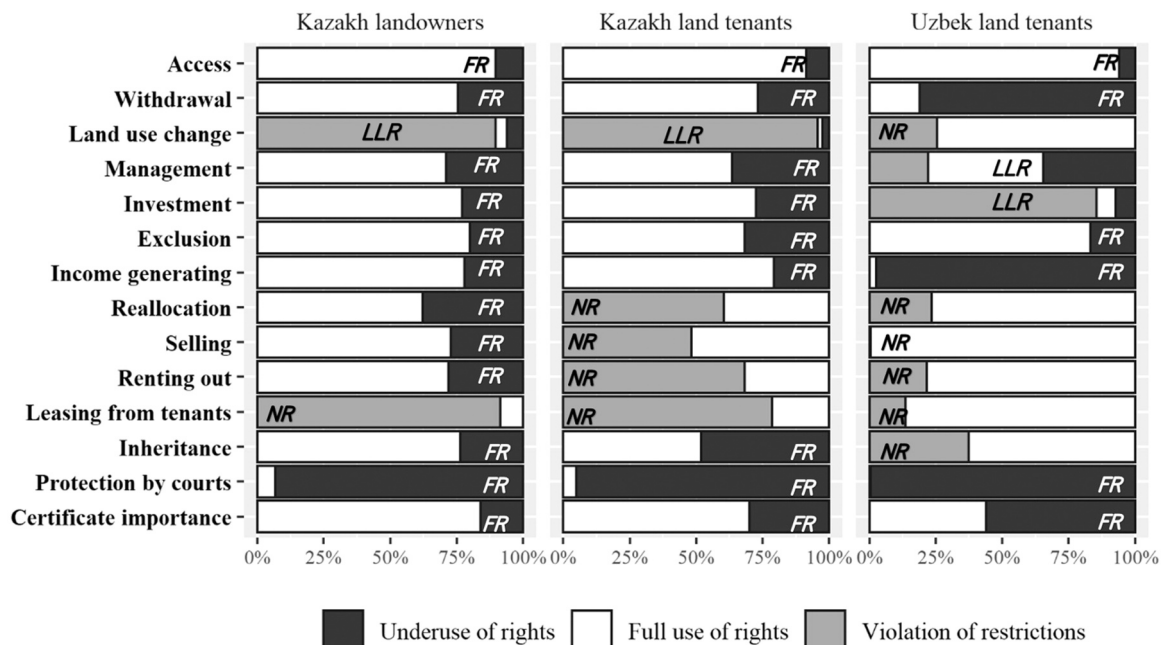


Fig. 2. Shares of positive, negative and no discrepancies between legal rights and actual practices by tenant types. Note: The sample size of Kazakh farmers with private land is 331; of Kazakh farmers with rented land is 164, of Uzbek farmers is 460. Abbreviations stand for FR=full right, LLR=limited right, and NR=no right for each of land rights.

average of three questions. Farmers were asked about the magnitude of trust in local courts to assist them in disputes on a tenancy with other farmers, investors outside of the region, and local administration. The lowest level of trust in courts was found to be in disputes with local administration for most farmers in both regions. The importance of land certificates was valued on the basis of their validity. Kazakh landowners perceive more security of land titles than do land tenants in Kazakhstan and Uzbekistan.

5.2. Empirical results

5.2.1. Controlling for endogeneity of LR-AP discrepancies

The econometric results of four ordered probit regressions (for each bundle of rights) based on the Lewbel's and 2SCML are presented in Table 6 (columns 1–4). The fifth column displays estimates of residuals generated from the first stage of 2SCML. The estimated coefficients in ordered probit models provide the average change in the standard normal value of the dependent variable for a unit change in the corresponding independent variable. The signs of estimated coefficients show the direction of their impacts on the willingness to intensify measured by the latent dependent variable.

The Lewbel's and 2SCML presume to apply several diagnostic tests for the first and second stages. The instruments in the first stage should be correlated with the corresponding endogenous variable. F-test is widely used for testing joint significance, and the common rule is that F statistic should be greater than 10 (Dow, 2008; Xue et al., 2016). Table 2A in the Appendix presents the test results for the first stage regressions and indicates that instruments are jointly significant in all first-stage regressions. Second, heteroscedasticity-based identification in the Lewbel's requires the heteroscedasticity in the first stage to produce constant conditional correlation (Lewbel, 2012). The results of the Breusch-Pagan test displayed in Table 2A indicate that residuals in almost all first-stage regressions are heteroscedastic. We assume that four regressions that do not produce heteroscedasticity will have no significant effect on the results of the second stage regressions, since the residuals might capture even low insignificant level of heteroscedasticity.

To deal with heteroscedasticity in the second stage regressions, we report robust standard errors in all 2SCML regressions. The significance test of the regression estimates for residuals (Table 6, column 5) can be used for a test of endogeneity of the corresponding endogenous variables (Rivers and Vuong, 1988). Our findings confirm the endogeneity of six discrepancy variables as their corresponding residuals are statistically significant. Although the rest of the residuals show no statistical significance, they might still control even for the low level of endogeneity of the corresponding variables (Dow, 2008). Moreover, the Wald tests on the joint significance of generated residuals in each of the four regressions confirm the endogeneity of discrepancies.

The 2SCML results show (Table 6, columns 1–4) that nine of twenty-one LR-AP discrepancies significantly determine farmers' intention. In the land use bundle (column 1), we have the following results: Positive discrepancy between the right to withdrawal and its actual practice negatively affects the intensification willingness. The violation of restrictions in the right to land use change also decreases the probability of land intensification. The negative impact indicates that both types of discrepancies generate tenure insecurity for farmers.

In the decision-making bundle (Table 6, column 2), the violation of restrictions in the management right, the positive discrepancy of the investment LR-AP, and the positive discrepancy of the land exclusion yield a negative impact on land intensification. It is worth mentioning that only Uzbek farmers have restrictions in land management and investment and, hence, can violate these restrictions and produce respective positive discrepancies (Fig. 2). Nevertheless, the violation of investment restrictions has a positive impact.

In the alienation bundle (Table 6, column 3), only one out of nine discrepancies has a statistically significant impact on the farmers'

**Table 6**  
Regression results with the Lewbel's and 2SCML.

Dependent variable: Willingness to intensify	(1)	(2)	(3)	(4)	(5) 1st stage residuals
<b>Personal and farm characteristics</b>					
Age	-0.003	-0.007*	-0.006	-0.002	
Education	-0.014	-0.016	-0.022	-0.029	
Land size, log	0.046	0.021	0.0976	0.074	
Distance, log	-0.232	-0.234	-0.163*	-0.099	
Special education (1–0)	0.284	0.300**	0.087	0.001	
Desired period	0.245	0.150**	0.210	0.263	
Consultancy services (1–0)	-0.061	-0.016	0.012	0.038	
Irrigation	-0.023	0.001	-0.043	-0.084	
Salinity	-0.238	-0.173	-0.262	-0.193	
Fertility	-0.019	-0.066	-0.002	0.037	
Uzbekistan (1–0)	-0.949	-1.223	-0.659	-0.447	
<b>Discrepancies</b>					
Access positive	0.067				-0.487**
Withdrawal positive	-0.0933				-0.127
Use change positive	-0.110				1.259
Use change violation	-0.509				0.413***
Management positive		-0.310			0.252
Management violation		-0.437			-0.882
Investment positive		-0.326			0.126
Investment violation		0.219*			-0.208
Exclusion positive		-0.190*			0.214*
Income generating positive		0.172			-0.187
Reallocation positive			0.025		0.469
Reallocation violation			-0.079		-0.064
Sell positive			-0.182*		1.756
Sell violation			0.083		0.089
Renting out positive			0.026		-2.735**
Renting out violation			0.120		-0.225*
Lease from tenants, violation			0.036		-0.087
Inheritance positive			-0.069		0.390
Inheritance violation			0.107		-0.120
Protection by courts, positive				-0.436	0.378**
Power of land certificates, positive				0.412	-0.233
$\theta_1$	-4.179	-4.008	-3.317	-3.155	
$\theta_2$	-3.446	-3.298	-2.605	-2.454	
$\theta_3$	-2.648	-2.492	-1.826	-1.705	
$\theta_4$	-0.988*	-0.815	-0.175	-0.0926	
Log-likelihood	-956.81	-954.21	-962.34	-975.30	
Model specification, $\chi^2$	132.99	143.59	119.76	86.62	
LR test	28.80	12.42*	24.65	12.68	
overidentification, $\chi^2$					
Pseudo-R2	0.0603	0.0629	0.0549	0.0421	
Sample size	955	955	955	955	

\* p < 0.05,  
\*\* p < 0.01,  
\*\*\* p < 0.001

willingness. The positive discrepancy of the land selling decreases farmers' desire to intensify indicating that underuse of the right to sell—the case only for Kazakh landowners—produces land tenure insecurity.

In the tenure security bundle (Table 6, column 4), farmers that perceive less tenure protection by government are found to have a lower willingness for land intensification. This finding proves that low trust in authorities undermines perceived tenure security (Rao et al., 2017). The discrepancy of the certificate importance in favour of the legal right is positively associated with land intensification. The low importance of land certificates for farmers is not a source of tenure insecurity for farmers in this study.

As for the control variables, we find that soil salinity and the distance to market exert a negative impact on land intensification that is compatible with literature (Headey et al., 2014; Feder and Savastano, 2017; Ma et al., 2017). The coefficient of the variable desired period is positive and significant, indicating that farmers who wish to use land for a longer period tend to intensify land use. A possible explanation for these findings is that land value is lower when farmland is distant from the market and has saline unproductive soil. On the other hand, when farmer plans to use land for a longer period, the value of land rises owing to higher future returns to land. The estimation result for the country

dummy shows that Uzbek farmers respond to be less willingness to raise yields in the future in comparison with Kazakh farmers. This finding can be explained by the fact that most Uzbek respondents are cotton producers who have intense government intervention. To protect themselves from the potential increase in quotas, farmers might intentionally misreport information (Mukhamedova, 2019). Additionally, under the current pricing regime higher yields will not necessarily result in higher income. As regards Kazakh farmers, their higher willingness to intensify might be associated with lower law enforcement that pushes farmers to concentrate on short-term benefits. Special agricultural education has a positive effect in all four models but is significant only in two models (columns 1 and 2), confirming that more qualified farmers are likely to intensify more.

5.2.2. Disaggregated analysis

To investigate whether the LR-AP discrepancies produce tenure insecurity in different institutional settings, we perform a disaggregated analysis. The 2SCML estimator was not applicable for separate datasets of Kazakh and Uzbek farmers because the Lewbel's instruments proved to be weak. We use the standard ordered probit method, despite it might be biased due to potentially endogenous variables.

Table 7 demonstrates the results of the standard ordered probit

Table 7  
Estimates of the ordered probit disaggregate models.

Dependent variable: Willingness to intensify	Kazakhstan				Uzbekistan			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Personal and farm characteristics</b>								
Age	-0.004	-0.006	-0.007*	-0.004	0.001	-0.001	-0.003	-0.001
Education	-0.024	-0.026	-0.024	-0.030	-0.017	-0.013	-0.012	-0.004
Land size, log	0.067	0.082	0.100	0.079	-0.017	0.036	0.021	0.100
Distance, log	-0.219***	-0.221***	-0.226***	-0.221***	-0.139	-0.146	-0.136	-0.055
Special education (1–0)	0.263**	0.232	0.237*	0.274**	0.159	0.089	0.105	-0.058
Desired period	0.143**	0.165**	0.182***	0.213***	0.295***	0.296**	0.249***	0.342***
Consultancy services (1–0)	0.214	0.159	0.205	0.176	-0.528***	-0.341*	-0.372**	-0.242
Irrigation	-0.182***	-0.153**	-0.138**	-0.178***	0.232***	0.276**	0.201**	0.177**
Salinity	-0.204***	-0.228***	-0.288***	-0.231***	-0.267**	-0.086	0.002	0.051
Fertility	-0.112	-0.158**	-0.159**	-0.123	0.206	0.202*	0.310***	0.365***
<b>Discrepancies</b>								
Access positive	-0.122				-0.256**			
Withdrawal positive	-0.419***				-0.148***			
Use change positive	0.206							
Use change violation	0.270**				-0.429***			
Management positive		-0.456***				0.411***		
Management violation						-0.352**		
Investment positive		-0.136				-0.274**		
Investment violation						0.375***		
Exclusion positive		0.109**				-0.120**		
Income generating positive		0.055				0.043		
Reallocation positive			0.024					
Reallocation violation			-0.039				-0.262***	
Sell positive			-0.136*					
Sell violation			0.043				-1.427*	
Rent out positive			-0.006					
Rent out violation			0.051				-0.374***	
Lease from tenants, violation			0.033				-0.060	
Inheritance positive			-0.072					
Inheritance violation							0.107*	
Protection by courts, positive				-0.242***				0.108
Power of land certificates, positive				0.187***				0.223***
$\theta_1$	-3.875***	-4.389***	-4.357***	-4.255***	-2.070**	-0.355	-1.218	0.573
$\theta_2$	-2.991***	-3.544***	-3.498***	-3.399***	-1.502*	0.23	-0.641	1.126
$\theta_3$	-2.273***	-2.834***	-2.793***	-2.701***	-0.547	1.223	0.302	1.966*
$\theta_4$	-0.651	-1.216*	-1.198*	-1.108*	1.297	3.089***	2.104***	3.689***
Log-likelihood	-494.32	-496.04	-501.19	-501.13	-433.98	-431.21	-441.26	-454.46
Model $\chi^2$	83.59***	80.16***	69.85***	69.97***	92.28***	97.82***	77.72***	51.31***
Pseudo-R2	0.0780	0.0748	0.0651	0.0653	0.0961	0.1019	0.0809	0.0534
Sample size	495	495	495	495	460	460	460	460

\* p < 0.05,  
\*\* p < 0.01,  
\*\*\* p < 0.001

regressions for Kazakhstan (columns 1–4) and Uzbekistan (column 5–8). The number of repressors in country-specific regressions differs from the number of repressors in the aggregated analysis due to the differences in normative settings of land use in two countries. As Kazakh farmers have fewer limitations in land rights, no negative discrepancies for management, investment, and inheritance rights were revealed. Uzbek farmers did not generate positive discrepancies for the land use change, reallocation, selling, renting out, and inheritance rights; and negative discrepancies for the right to sell.

Although results in Table 7 have similarities with the results in Table 6, they provide more details on institutional regressors. The underuse of the right to access land induces a reduction in land intensification in Uzbekistan. The violation of land use change right has a positive impact on Kazakh farmers' willingness and a negative impact in the case of Uzbek farmers. A positive discrepancy in management has controversial but significant impacts in the disaggregated analysis. While it affects negatively Kazakh farmers, Uzbek farmers tend to increase production. This positive impact among Uzbek farmers can be explained by the fact that despite the strong restrictions in cultivation methods, crop selection, and the application of fertilizers and pesticides, the government subsidizes inputs and seeds to cotton and wheat producers. The statistically significant impacts of positive discrepancies in the investment right and negative discrepancies for the land reallocation, selling, renting out, and inheritance are observed only in the Uzbekistan case. The underuse of the right to exclusion does not affect the probability of land intensification in the aggregated analysis but has a controversial impact in disaggregated regressions. The less Uzbek farmers use the right to exclude the less is their willingness to intensify land use. The positive discrepancy of land rights protection has a significant effect only for Kazakh farmers.

Except for the desired period, other control variables demonstrate inconsistency between the two countries. Distance and special education have no significant effect on the Uzbek farmers' willingness for land intensification anymore, whereas consultancy services reduce the willingness. Contradictory results emerge for irrigation conditions and soil fertility. While these variables increase the willingness to intensify in the Uzbekistan case, Kazakh farmers prove to reduce intensification with better irrigation and fertility conditions.

## 6. Conclusion

This study examines the association between tenure insecurity originating from the discrepancies between formal land rights and individual perceptions of these rights, and the farmers' intention to increase agricultural production in southern Kazakhstan and eastern Uzbekistan. The results show that most discrepancies are negatively associated with farmers' intentions, regardless of whether the discrepancy is negative or positive. However, in some cases, such as violation of investment restrictions and insufficient power of land certificates, discrepancies might generate a positive impact on farmers' intentions. These findings empirically prove the assumption made by Klümper et al. (2018) that mismatches between real claims and property rights can lead to a reduction in productivity and less investment. This paper confirms that analysing sources of tenure insecurity and implications matters. We demonstrate that the innovative approach to evaluating legal land rights and perceived property rights can be used in empirical and descriptive studies. The added value of this study lies not only in contributing to discussions on how to operationalize land rights and tenure security but also in extending the geographical scope of these discussions to Central Asia, a region that still remains under-researched in this regard.

Comparative analysis of the difference between legal rights and actual practices reveals that Kazakh farmers have a higher propensity to violate limitations in land rights in comparison to Uzbek farmers. One reason will be probably the stronger law enforcement in the agricultural sector in Uzbekistan. Furthermore, we identified inconsistencies

between the land code and government decrees on strategic crops in Uzbekistan. Particularly, cotton and wheat producers are exposed to stronger limitations and government interventions in land use. Kazakh farmers demonstrate that limitations in the land use change right and the right to lease land from other farmers, who rent state land, are not enforced effectively. In addition, a larger group of Kazakh land tenants, who face limitations for land transactions on paper, perceive that they can violate these limitations. This situation verifies previous claims about the ineffectiveness of land reforms in Central Asian countries (Lerman and Sedik, 2018; Oshakbayev et al., 2018; Mukhamedova and Pomfret, 2019).

To close the gap between land rights and actual practices and to reduce tenure insecurity in Kazakhstan and Uzbekistan, governments should consider additional measures with regards to land legislation. Land use constraints should be revised as to how far they are necessary to reach policy objectives. Improvements in land tenure system may not only directly foster a better functioning of agricultural output markets by allowing farmers more options for crop diversification but also contribute indirectly via a stimulation of agricultural land markets. More viable land markets, which are currently rather inactive in both countries, will strengthen the role of more productive farmers which also contributes to a better food security.

In addition, individual reasons behind violations of restrictions and underuse of land rights can be explored in future research to design land policies in a more applicable way. Additional legislative documents (e.g. regarding strategic crops) should also be tailored in consistency with land codes to improve farmers' trust in institutions and the rule of law.

Finally, some limitations of the analysis at hand provide avenues for further research. While this study empirically reveals the importance of including LR-AP discrepancies into the analysis of farmers' decisions, it also has several limitations. Firstly, we have not been able to quantify law awareness at the individual level. Having such an indicator would help in exploring the reasons of land rights' underuse more in-depth. Second, data on differences in land code's implementation within and across villages and districts have not been available. Nevertheless, governments should verify whether farmers are aware of current land rights and whether land reforms are implemented equally for all farmers.

## Declaration of Competing Interest

None

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## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.landusepol.2021.105726](https://doi.org/10.1016/j.landusepol.2021.105726).

## References

- Agribusiness-2020, 2012. Program for the Development of Agro Industrial Complex in the Republic of Kazakhstan for 2013-2020 Years, Ministry of Agriculture of the Republic of Kazakhstan. Ministry of Agriculture of the Republic of Kazakhstan, Astana.
- Ajzen, I., 1991. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* 50, 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T).
- Ajzen, I., Fishbein, M., 1980. *Understanding attitudes and predicting social behavior.* Prentice-Hall, Englewood Cliffs, N.J.



- Ayamga, M., Yeboah, R.W.N., Ayambila, S.N., 2016. An analysis of household farm investment decisions under varying land tenure arrangements in Ghana. *J. Agric. Rural Dev. Trop. Subtrop.* 117, 21–34.
- Besley, T., 1995. Property rights and investment incentives: theory and evidence from Ghana. *J. Polit. Econ.* 103, 903–937.
- Boserup, E., 1965. *The Conditions of Agricultural Growth*. Aldine Publications, Chicago.
- Brasselle, A.-S., Gaspard, F., Platteau, J.-P., 2002. Land tenure security and investment incentives: puzzling evidence from Burkina Faso. *J. Dev. Econ.* 67, 373–418. [https://doi.org/10.1016/S0304-3878\(01\)00190-0](https://doi.org/10.1016/S0304-3878(01)00190-0).
- Broegaard, R.J., 2005. Land tenure insecurity and inequality in Nicaragua. *Dev. Change* 36, 845–864.
- Brookfield, H., 2001. Intensification, and alternative approaches to agricultural change. *Asia Pac. Viewp.* 42, 181–192. <https://doi.org/10.1111/1467-8373.00143>.
- Chavance, B., 2008. Formal and informal institutional change: the experience of postsocialist transformation. *Eur. J. Comp. Econ.* 5, 57–71.
- Deininger, K., 2003. *Land Policies for Growth and Poverty Reduction*. World Bank Policy Research Report. Washington, DC.
- Djanibekov, N., van Assche, K., Bobojonov, I., Lamers, J.P.A., 2012. Farm restructuring and land consolidation in Uzbekistan: new farms with old barriers. *Eur. - Asia Stud.* 64, 1101–1126. <https://doi.org/10.1080/09668136.2012.691720>.
- Dow, M.M., 2008. Network autocorrelation regression with binary and ordinal dependent variables: Galton's problem. *Cross-Cult. Res.* 42, 394–419. <https://doi.org/10.1177/1069397108320411>.
- Ellickson, R.C., 1986. Of coase and cattle: dispute resolution among neighbors in Shasta county. *Stanf. Law Rev.* 38, 623.
- Feder, G., Feeny, D., 1991. Land tenure and property rights: theory and implications for development policy. *World Bank Econ. Rev.* 5, 135–153. <https://doi.org/10.1093/wber/5.1.135>.
- Feder, G., Savastano, S., 2017. Agriculture and Rural Development in a Globalizing World. In: Pingali, P., Feder, G. (Eds.), *Agriculture and Rural Development in a Globalizing World*. Routledge, New York, NY. <https://doi.org/10.4324/9781315314051>.
- Feder, G., Onchan, T., Chalamwong, Y., Hongladarom, C., 1988. *Land Policies and Farm Productivity in Thailand*. The Johns Hopkins University Press, Baltimore MD.
- Fishbein, M., Ajzen, I., 2010. *Predicting and Changing Behavior: The Reasoned Action Approach*. Psychology Press, New York.
- Galik, C.S., Jagger, P., 2015. Bundles, duties, and rights: a revised framework for analysis of natural resource property rights regimes. *Land Econ.* 91, 76–90. <https://doi.org/10.3368/le.91.1.76>.
- Gustavsson, J., Cederberg, C., Sonesson, U., van Otterdijk, R., Meybeck, A., 2011. *Global Food Losses and Food Waste: Extent Causes and Prevention*. Rome.
- Hair, J.F., Hult, G.T., Ringle, C., Sarstedt, M., 2017. *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage.
- Hanson, M., 2017. *Legalized rent-seeking: eminent domain in Kazakhstan*. Cornell Int. Law J. 50.
- Headey, D., Dereje, M., Seyoum Taffesse, A., 2014. Land constraints and agricultural intensification in Ethiopia: A village-level analysis of high-potential areas. *Food Policy* 48, 129–141. <https://doi.org/10.1016/j.foodpol.2014.01.008>.
- Holden, S.T., Ghebru, H., 2016. Land rental market legal restrictions in Northern Ethiopia. *Land Use Policy* 55, 212–221. <https://doi.org/10.1016/J.LANDUSEPOL.2016.04.006>.
- Holden, S.T., Otsuka, K., 2014. The roles of land tenure reforms and land markets in the context of population growth and land use intensification in Africa. *Food Policy* 48, 88–97. <https://doi.org/10.1016/j.foodpol.2014.03.005>.
- Honore, A.M., 1961. *Ownership*, Oxford Essays in Jurisprudence. Oxford University Press, Oxford.
- Kay, R.D., Edwards, W.M., 1994. *Farm Management*, 3rd ed. McGraw-Hill, New York.
- Klümpfer, F., Theesfeld, I., Herzfeld, T., 2018. Discrepancies between paper and practice in policy implementation: Tajikistan's property rights and customary claims to land and water. *Land Use Policy* 75, 327–339. <https://doi.org/10.1016/J.LANDUSEPOL.2018.03.030>.
- Kvartuik, V., Petrick, M., 2021. Liberal land reform in Kazakhstan? The effect on land rental and credit markets. *World Dev.* 138, 105285. <https://doi.org/10.1016/j.worlddev.2020.105285>.
- Lawry, S., Samii, C., Hall, R., Leopold, A., Hornby, D., Mtero, F., 2014. The impact of land property rights interventions on investment and agricultural productivity in developing countries: a systematic review. *Campbell Syst. Rev.* 10, 1–104. <https://doi.org/10.4073/csr.2014.1>.
- Lefebvre, M., Raggi, M., Gomez Paloma, S., Viaggi, D., 2014. An analysis of the intention-realisation discrepancy in EU farmers' land investment decisions MOSES-Managing crop water saving with enterprise services view project A mountain food label for Europe?: the role of food labelling and certification in delivering sustainable development in European mountain regions View project. *Rev. d'Études En. Agric. Environ.* 95. <https://doi.org/10.4074/S1966960714011047>.
- Lerman, Z., Sedik, D., 2018. Transition to smallholder agriculture in Central Asia. *J. Agrar. Chang.* 18, 904–912. <https://doi.org/10.1111/joac.12282>.
- Lewbel, A., 2012. Using heteroscedasticity to identify and estimate mismeasured and endogenous regressor models. *J. Bus. Econ. Stat.* 30, 67–80. <https://doi.org/10.1080/07350015.2012.643126>.
- Ma, X., Heerink, N., Van Ierland, E., Lang, H., Shi, X., 2015b. Impact of Tenure Security and Trust on Land Rental Market Development in Rural China, in: International Conference of Agricultural Economists. Milano.
- Ma, X., Heerink, N., Feng, S., Shi, X., 2015a. Farmland tenure in China: Comparing legal, actual and perceived security. *Land Use Policy* 42, 293–306. <https://doi.org/10.1016/j.landusepol.2014.07.020>.
- Ma, X., Heerink, N., Feng, S., Shi, X., 2017. Land tenure security and technical efficiency: new insights from a case study in Northwest China. *Environ. Dev. Econ.* 22, 305–327. <https://doi.org/10.1017/S1355770x1600036X>.
- Meinzen-Dick, R., 2014. Property rights and sustainable irrigation: a developing country perspective. *Agric. Water Manag.* 145, 23–31. <https://doi.org/10.1016/j.agwat.2014.03.017>.
- Melniková, L., Havrland, B., 2016. State ownership of land in Uzbekistan – an impediment to further agricultural growth? *Agric. Trop. Subtrop.* 49, 5–11. <https://doi.org/10.1515/ats-2016-0001>.
- Morduch, J., 1995. Income smoothing and consumption smoothing. *J. Econ. Perspect.* 9, 103–111.
- Mukhamedova, N., 2019. *Responses to Agrarian Transition in Central Asia*. Martin Luther Universität Halle Wittenberg.
- Mukhamedova, N., Pomfret, Richard, 2019. Why does sharecropping survive? agrarian institutions and contract choice in Kazakhstan and Uzbekistan. *Comp. Econ. Stud.* 61, 576–597. <https://doi.org/10.1057/s41294-019-00105-z>.
- Muradov, B., Ilkhamov, A., 2014. *Uzbekistan's Cotton Sector: Financial Flows and Distribution of Resources*, Working Paper. New York, NY.
- Mwangi, E., Meinzen-Dick, R.S., 2009. *Understanding Property Rights in Land and Natural Resource Management*. In: Kirsten, J.F., Dorward, A.R., Poulton, C., Vink, N. (Eds.), *Institutional Economics Perspectives on African Agricultural Development*. International Food Policy Research Institute (IFPRI), Washington, D.C., pp. 295–318.
- Nederhof, A.J., 1985. Methods of coping with social desirability bias: a review. *Eur. J. Soc. Psychol.* 15, 263–280. <https://doi.org/10.1002/ejsp.2420150303>.
- Newman, C., Tarp, F., Van Den Broeck, K., 2015. Property rights and productivity: the case of joint land titling in Vietnam. *Land Econ.* 91, 91–105. <https://doi.org/10.3368/le.91.1.91>.
- Öhlmér, B., Olson, K., Brehmer, B., 1998. Understanding farmers' decision making processes and improving managerial assistance. *Agric. Econ.* 18, 273–290. [https://doi.org/10.1016/S0169-5150\(97\)00052-2](https://doi.org/10.1016/S0169-5150(97)00052-2).
- Oshakbayev, D., Taitukova, R., Petrick, M., Djanibekov, N., 2018. Kazakhstan's cotton sector reforms since independence (No. 172), Discussion Paper. Halle (Saale).
- Petrick, M., Pomfret, R., 2016. *Agricultural policies in Kazakhstan (No. 155)*, Discussion Papers. Halle (Saale).
- Place, F., 2009. Land tenure and agricultural productivity in Africa: a comparative analysis of the economics literature and recent policy strategies and reforms. *World Dev.* 37, 1326–1336. <https://doi.org/10.1016/j.worlddev.2008.08.020>.
- Prell, C., Reed, M.S., Racine, L., Hubacek, K., 2010. Competing structure, competing views: the role of formal and informal social structures in shaping stakeholder perceptions. *E&S* 15, art34.
- Qu, S., Heerink, N., Xia, Y., Guo, J., 2018. Farmers' satisfaction with compensations for farmland expropriation in China: evidence from micro-level data. *China Agric. Econ. Rev.* 10, 572–588. <https://doi.org/10.1108/CAER-07-2016-0094>.
- Rao, F., Spoor, M., Ma, X., Shi, X., 2017. Perceived land tenure security in rural Xinjiang, China: the role of official land documents and trust. *China Econ. Rev.* <https://doi.org/10.1016/j.chieco.2017.03.009>.
- Rivers, D., Vuong, Q.H., 1988. Limited information estimators and exogeneity tests for simultaneous probit models. *J. Econom. Ser.* 39, 347–366.
- Rozelle, S., Swinnen, J.F.M., 2009. Why did the communist party reform in China, but not in the Soviet Union? The political economy of agricultural transition. *China Econ. Rev.* 20. <https://doi.org/10.1016/j.chieco.2008.10.014>.
- Satpayev, D., 2014. *Corruption in Kazakhstan and the Quality of Governance (No. 475)*, IDE Discussion Papers. Chiba, Japan.
- Schlager, E., Ostrom, E., 1992. Property-rights regimes and natural resources: a conceptual analysis. *Source L. Econ.* 68, 249–262.
- Scott, A., 2008. *The Evolution of Resource Property Rights*. Oxford University Press, New York. <https://doi.org/10.1093/acprof:oso/9780198286035.001.0001>.
- Sikor, T., He, J., Lestrelin, G., 2017. Property rights regimes and natural resources: a conceptual analysis revisited. *World Dev.* 93, 337–349. <https://doi.org/10.1016/J.WORLDDEV.2016.12.032>.
- Sjaastad, E., Bromley, D.W., 2000. The prejudices of property rights: on individualism, specificity, and security in property regimes. *Dev. Policy Rev.* 18, 365–389. <https://doi.org/10.1111/1467-7679.00117>.
- Twerefou, D.K., Osei-Assibey, E., Agyire-Tettey, F., 2011. *Land tenure security, investments and the environment in Ghana*. *J. Dev. Agric. Econ.* 3, 261–273.
- UNHR, U.N.H.R., 2015. *Land and Human Rights Standards and Applications*.
- Viira, A.-H., Pöder, A., Värnik, R., 2014. Discrepancies between the intentions and behaviour of farm operators in the contexts of farm growth, decline, continuation and exit – evidence from Estonia. *Ger. J. Agric. Econ.* 63, 46–62.
- Ward, R.G., Kingdon, E., 1995. *Land Use and Tenure: Some Comparisons*. In: Ward, R.G., Kingdon, E. (Eds.), *Custom and Practice in the South Pacific*. Cambridge University Press, Cambridge, UK, pp. 6–35.
- World Bank, 2007. *World Development Report 2008: Agriculture for Development*. Washington, DC.
- World Bank, 2018. *A new growth model for building a secure middle class Kazakhstan Systematic Country Diagnostic*.
- Xue, X., Mo, E., Reed, W.R., 2016. The relationship between social capital and self-reported health in China. *Economics* 10, 1–45. <https://doi.org/10.5018/economics-ejournal.ja.2016-13>.
- Zorya, S., Djanibekov, N., Petrick, M., 2019. *Farm Restructuring in Uzbekistan: How Did It Go and What is Next?*, World Bank Working Papers. Washington, D.C.