

Colonization and changing social structure: Evidence from Kazakhstan

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Abstract

We study how Russian colonization of the Kazakh steppes in the late 19th century influenced the evolution of traditional institutions of Kazakhs. Using a rich dataset constructed from Russian colonial expedition materials, we find that during the transition from nomadic pastoralism to a semi-sedentary pastoralist-agricultural system, Kazakhs' traditional communes shrank, property rights on land became more individualized, and households became less likely to pool labor for farming. We argue that two main forces behind this evolution were increasing land pressure and technological change. The speed and the magnitude of these adjustments were much larger than usually assumed in most of development economics literature on traditional institutions.

Keywords: Extended family, clan, property rights, institutional change, colonization, Kazakhstan.

JEL Codes: N55, O13, Q15, Z13.

1. Introduction

Development economists and economic historians are currently debating about the role that families, kinship networks, and clans play in shaping individual incentives and determining aggregate economic outcomes and development trajectories. Researchers have documented the importance of these institutions for migration decisions, occupational choice, credit transactions, provision of public goods, transmission of knowledge and technology adoption, and numerous other aspects of economic life (see, for instance, Wegge, 1998; LaFerrara, 2003; Leunig et al., 2011; Gupta, 2014; Greif and Tabellini, 2015; De La Croix et al., 2016; Guirking and Aldashev, 2016).¹ The importance of these traditional institutions have been shown in highly diverse contexts, spanning all areas of the developing world (for India, see Platteau, 1995, Munshi and Rosenzweig, 2006, and Gupta, 2014; for China, see Freedman, 1958, and Greif and Tabellini, 2015; for Mexico, see Munshi, 2003; for Sub-Saharan Africa, see Platteau, 2000, and LaFerrara, 2003, etc.).

Traditional institutions, however, are not fixed in time and tend to evolve in response to changes in the socio-economic environment. Social historians and anthropologists have extensively studied the evolution of family institutions and the role of economic factors behind such evolution (see, for instance, Goody, 1983, Seccombe, 1992, and Todd, 2011). Similarly, the study of institutional change has been for long time an active area of research in economic history (the classic contributions include Davis and North, 1971; North, 1990; and Greif, 2006).

Development economists, however, tend to ignore changes in traditional institutions when examining empirically the impact of policies or changes in resource endowments, making the assumption that these institutions (such as, for instance, co-residence patterns, inheritance practices, or marriage arrangements) change very slowly, and thus, that taking them as given is not problematic (see Fafchamps and Quisumbing, 2007, and Cox and Fafchamps, 2007, for extensive reviews). Interestingly, recent contributions start to challenge this assumption, by analyzing how household composition (and, in some cases, pre-mortem inheritance practices) evolve in response to technological change (Foster and Rosenzweig, 2002), rising land pressure (Guirking and Platteau, 2015), land policies (Bardhan et al., 2014), or programs of public

¹ Cox and Fafchamps (2007), LaFerrara (2011), and Munshi (2014) provide excellent surveys of this literature.

transfers (Hamoudi and Thomas, 2014).² These studies suggest that ignoring impacts of policy on household divisions may lead to substantial biases in the evaluation of policies.

One of the difficulties in studying change in traditional institutions is limited data availability. Ideally, one needs a panel data including both the measures of institutions and behavior (preferably, at micro-level), with sufficiently large time frame. Moreover, such data should come from episodes or periods of relatively large-scale changes in the economic environment of the society under study. However, such combination of circumstances and data is rare.

In this paper we study how traditional institutions of Kazakhs changed in response to Russian peasant colonization.³ In particular, we analyze the evolution of rules governing the allocation of land and labor within Kazakh extended families in the late 19th – early 20th century, using data from two waves of Russian colonial statistical expeditions in Central Asia. During this period, the massive Russian peasant in-migration forced Kazakh nomadic pastoralists to change their production systems and to gradually become more sedentary. After describing and quantifying the adaptation of traditional institutions to the new conditions, we discuss the economic mechanisms likely to explain the observed patterns of change.

More specifically, using a proxy for the density of Russian settlers and the panel structure of the data, we show that as colonization progressed, property rights on land within Kazakh families and clans became increasingly individualized. The size of the group of families exploiting jointly summer pastures (the so-called communes) decreased. These groups federated families from the same clan, and we find that clan-based identity itself was deeply modified over the 10-12-year period between the two waves of data. Furthermore, joint production within the extended families gave way to more individual forms of land and labor use, centered on nuclear households. Simultaneously, labor markets developed: richer households increased their reliance

² There also exist a small but growing theoretical literature studying the dynamics of the interaction between formal/modern and informal/traditional institutions in developing-country contexts (see Kranton, 1996, Banerjee and Newman, 1998, McLaren and Newman, 2002, Aldashev et al., 2012).

³ Our previous work (Guirkingner and Aldashev, 2016), focusing on the same period and context and relying partly on the same data sources, studies the effect of clan institutions on technology adoption and organization of production. The current paper studies the effect of Russian colonial settlement on the Kazakhs' clans and extended families themselves.

on hired workers from poorer households, both from their own extended family and outside it. The speed of these changes is striking. For example, over the 10-12-year period, the number of communes increased by more than 40 per cent in some provinces and the number of clans enumerated increased by 40 to 90 per cent. Simultaneously the collective exploitation of hay parcels decreased by up to 27 percentage points, replaced by a distribution of parcels to individual households. Simultaneously, the share of extended families that delegated crop cultivation to individual households (as opposed to joint cultivation) increased by up to 19 percentage points while the share of households that hired workers for crop cultivation increased by 10 percentage points.

Turning to potential explanations for the growing individualization of property rights and production, we argue that two key drives were population pressure and technological change. These factors have been mentioned repeatedly as causes of individualization processes in other contexts (Boserup, 1965, Demsetz, 1967, Platteau 1996, Binswanger and McIntire, 1987, Putterman, 1989, Foster and Rosenzweig, 2002, Guirking and Platteau, 2015). We do not formally establish a causal link between these factors and the processes of individualization, but we provide evidence indicating that individualization occurred earlier in areas where land pressure was stronger and changes in the production system deeper (i.e. in the vicinity of Russian settlements). Regarding the simultaneous development of labor markets, a possible cause could be the exclusion of certain households from the distribution of collective resources during the individualization process, thus confirming the predictions of models of common-property resources privatization (Weitzman, 1974, Baland and François, 2005, Baland and Bjorvatn, 2013). These households then had to turn to wage labor. In addition, we argue that formal labor contracts were likely gradually replacing traditional systems of labor exchange (akin to patron-client relationship) embedded within extended families (Platteau, 1995).

The remainder of the paper is structured as follows. Section 2 introduces the data and the historical background. Section 3 describes the changes in Kazakh traditional institutions occurring during Russian colonization. In Section 4 we turn to the economic mechanisms that help explaining the growing individualization of land within families and the development of labor markets. Section 5 concludes.

2. Data and historical background

2.1. Data sources

Our main source of data are the materials collected by the Russian colonial expeditions into Kazakhstan, conducted in two waves (Shcherbina, 1898, 1902a, 1902b, 1903a, 1903b, 1907, 1908; Kuznetsov 1909, 1910a, 1910b, 1910c, 1910d; Hovorostanskii 1912a, 1912b). The first-wave expedition, headed by Fedor Shcherbina, lasted from 1896 to 1903 and covered 12 provinces in 3 regions in Western, Northern, and Central Kazakhstan.⁴ Virtually all Kazakh households living in these 12 provinces were included in the survey.⁵ Later on, the Russian colonial administration financed another wave of expeditions. This second wave took place between 1907 and 1913 and consisted of 5 separate smaller expeditions. Three expeditions allowed to obtain repeated observations for 10 of 12 provinces analyzed in the first wave.⁶ In addition, two expeditions collected data from the Southern part of Kazakhstan that was not reached by the first-wave expedition.⁷ Guirkinger and Aldashev (2016) provide the details of the history of the expeditions, their objectives, the types of data that were collected, as well as a summary of the critical analyses concerning the reliability of this data. In brief, the expedition materials constitute highly reliable and detailed agricultural censuses. The results for each province were published as a separate volume, each containing a descriptive part and a series of annexes.⁸ The annexes (from which we extracted most of the information used in our analyses) contain tables with demographic (age and gender structure), economic (livestock wealth,

⁴ As in Guirkinger and Aldashev (2016), we adopt the following convention in translating the names of administrative levels created by the Russian administration in the Kazakh steppes: the large administrative area (*oblast*) corresponds to a *region*, its sub-division (*uezd*) to a *province*, and the smaller administrative area (*volost*) to a *district*.

⁵ The interviewers conducted a separate interview for each household within an extended family (defined below). However, the household-level data is not available, given that such data was aggregated (at the extended-family level or by wealth category) for the publication of expedition materials.

⁶ These expeditions are: Kuznetsov (covering the entire Akmolinsk region), Perepletchikov (covering 3 of 5 provinces of the Semipalatinsk region), and Hovorostanskii (covering the entire Turgay region and 3 of 4 provinces of Ural'sk region).

⁷ These expeditions are: Skryplev (covering the entire Syr-Darya region) and Rummyantsev (covering the entire Semirechie region).

⁸ These volumes, over 30 in total, are now bibliographic rarities. We were able to locate a few of them, scattered among several libraries throughout the world; we then organized the scanning of the data annexes and encoding of the scanned pages into a spreadsheet format. This paper is based on the data that we built up from the annexes of volumes corresponding to seven provinces.

cultivation, labor relations), technological (techniques of agriculture, tools used), and institutional (regulation of land use and ownership) variables aggregated at various levels.

In this paper, we use aggregate data at the province level from the two waves of expeditions for 7 provinces of Northern and Central Kazakhstan (Aktuybinsk, Kustanay, and the entire Akmolinsk region with its 5 provinces), as well as extended family level data from the first wave for the same provinces (approximately 11 300 observations). In addition, for one province (Petrovavl) we matched the extended-family questionnaires across the two waves of expeditions and constructed a panel dataset with 1 335 extended families. Figure 1 shows the geographic location of these provinces and provides some basic economic information about our area of study. Definitions and descriptive statistics for the extended-family dataset are presented in Table 1.

2.2. Kazakh nomadic-pastoralist economy

Nomadic pastoralism became the dominant production system in Kazakhstan around 1000 BCE (following the worsening of the climatic conditions for agriculture) and remained so until the middle of the 19th century, when Russian in-migration into the Kazakh steppes took off. Horses, sheep, and cattle represented the main stock of wealth, as well as the key production inputs and the principal sources of food. The nomadic pastoralism consists of seasonal transhumance, i.e. of changing physical location of households and their livestock between two and four times during the calendar year. This transhumance between summer and winter pastures (with relatively shorter stays on intermediate autumn and spring stops) is necessary because under this system livestock subsists throughout the year on natural grass cover as fodder; thus, remaining permanently on the same place would rapidly become unsustainable.⁹

This carefully balanced system developed through centuries of adaptation to the geography and the climate of the area. Summer pastures provided abundant fodder during the warmer months but became inhabitable in winter. Distances between winter and summer pastures were large, often exceeding 200 kilometers (Matskevich 1929; Ferret 2014). The scarcity of good winter pastures (i.e. areas close to rivers, lakes, and hills) implied the need to preserve the fodder of the winter pasture for the next year. This need, coupled with the relatively flat landscape in

⁹ Ferret (2014) provides a detailed classification of the main forms of nomadic pastoralism in Central Asia at the end of the 19th century.

most of the Central and Western Kazakhstan, resulted in long-distance seasonal transhumance of Kazakhs.

The harsh climatic conditions of the steppe and the reliance on natural grass cover (rather than on producing and stocking fodder) implied that the nomadic-pastoralist system was vulnerable to climatic shocks. *Jut*, the Kazakh word for a particularly dry summer (during which animals were unable to accumulate enough fat) followed by a harsher-than-normal winter, implied huge generalized losses of livestock. For instance, Tolybekov (1971: 541-542) reports that 59 per cent of total livestock was lost during the *jut*-year winter of 1879/80 in Irghiz and Turgay provinces. The frequency of such shocks was high: the winters of 1850/51, 1855/56, 1879/80 and 1891/92 were *jut* years leading to large-scale losses of livestock (Tolybekov 1971: 542).¹⁰

This vulnerability to climatic shocks was substantially mitigated by some of the technological changes in livestock management that Russian migrants brought into the Steppe during the 19th century. Contemporary accounts attest that hay-making started in the Kazakh steppes in 1840s. Daulbayev (1881), describing the economic organization of the Kazakhs of Kustanay province between 1830 and 1880, writes:

“[Around 1830] they moved regularly during the winter along those rivers from one place to another, with their livestock and families, seeking forage for their animals, given that no one among them prepared hay for winter and did not do any cultivation... After [the administrative] changes [of 1835-1840s], first the Kazakhs living closest to the Russian settlements, and later also others, taking their Russian neighbors as examples, started to prepare hay for their livestock for winter and to build winter enclosures for their animals” (Daulbaev 1881: 99, 113).

Several other authors indicate that this technique was transmitted to Kazakhs by their Russian neighbors (Katanaev, 1904; Shcherbina 1908: 202-208; Kurylev 1998: 34-35). Crucially, these changes implied that the period of stay on the winter stop could be lengthened, as livestock no

¹⁰ The management of climatic risks to livestock is one of the main problems faces by Mongolia that currently features the society and economic organization most similar to Kazakhs of the period under study (see Benson, 2011, and World Bank, 2015). The Mongolian word for such climatic shock, *dzud*, is of the same origin as the Kazakh *jut*.

longer depended solely on the natural grass cover in winter. Another positive effect of this innovation was that livestock was more likely to survive the harsh *jut* years.

2.3. Family and clan institutions of Kazakhs

The nomadic-pastoralist society of the Steppe was structured around the clan system, which consisted of complex networks of blood-related lineages. The clan identity was transmitted from fathers to sons, whereas women integrated their husband's clan. This social organization was structured in several layers (see Figure 2), each with a specific economic and social role.

The smallest unit was a household consisting of a married couple with several children and, sometimes, other close relatives. A household held private property on livestock but not on land. The smallest unit with claims on land was the extended family (called *aul-q'stau* in Kazakh and *khozyajstvenniy aul* in Russian). This was a small community of several nuclear households (around 9-10 households in our data) that were usually closely related by kin. An extended family spent the whole year together, its households living at a very short distance from each other during winter at the winter stop and migrating – together with other extended families of the same clan – to the summer pasture. Several extended families jointly constituted a clan (*atabalasy* or “descendants of the same grandfather” in Kazakh), whereas several clans composed a tribe (*ru* in Kazakh).

There was a substantial degree of inequality within extended families, mostly because livestock ownership was on the basis of nuclear households. A typical extended family included one or two wealthy households (“*bay*”) as well as their poorer relatives, which were often economically dependent on *bay*'s household. The main role of the extended family (headed by a patriarch called *aqsaqal*, or “a white-bearded man”) was the management of land on winter pastures. The traditional pasture management was a closed-access common-property regime: all the households composing the extended family joined their livestock into a common herd that grazed the pasture on the winter stop owned by the family.

The next level of social structure – the clan – fulfilled several other key functions. It played a central role in nomadic production through its coordination of joint transhumance, to and from the summer pasture, and the regulation of access to land on the summer pastures. Towards the end of winter, the heads of extended families belonging to the same clan sent messengers to each other, to coordinate the timing of migration to the summer pasture that they

jointly exploited (Chormanov, 1906). The coordinated move to the summer pastures was fundamental, to organize the defense against possible raids by thieves during the move, to facilitate the appropriation of summer pastures (as land rights on summer pastures were relatively loosely defined and inter-clan conflicts over their boundaries were common), and to enable a clan to exploit economies of scale in caring after the herds (Masanov, 2011: 408).

Second, the clan provided insurance against economic shocks hitting its members. For instance, if a family lost livestock to predators or a particularly harsh winter, other members of the clan provided the family with a certain amount of livestock (Vladimirtsov, 1934). This insurance scheme was possible because of a large geographic spread between winter pastures of the members of the same clan.¹¹

2.4. Russian resettlement and colonization

In the first half of the 18th century, facing extended wars with their Eastern neighbors from China, Kazakh tribes officially requested to become a protectorate of the Russian Empire. Through the 19th century, the Russian emperors gradually transformed the protectorate status of the Kazakh Steppes into that of a colony through a series of political and administrative reforms and military interventions (Abuseitova et al., 2001, pp. 353-359).

The migration of Russians into Kazakhstan that started in the 17th century was initially small but accelerated in the last quarter of the 19th century, reaching its peak in the 1910s. It developed in two phases: Cossack military settlements and the in-migration of poor peasants from the European part of the Russian empire. It was the second, much larger, phase that led to fundamental structural changes in the Kazakh nomadic economy. This phase started in 1860s (Galiev, 2009: 223; Demko, 1969: 52), following the Czar Alexander II's 1861 Emancipation Reform (i.e. the abolition of serfdom). Between 1861 and 1889, peasants migrated without State encouragement and planning; however, the Czarist administration tolerated this migration because it eased land pressure in the European part of Russia. The year 1889 marked the adoption of the First Resettlement Bill: the State officially started to encourage peasant in-migration into the Kazakh Steppes and tried to actively regulate it. This bill granted land allotments to Russian landless peasants, in the amount of 15 *desyatinas* (approximately 16.4 hectares) per household, in

¹¹ For a discussion of other roles played by clans, see pp. 88-90 of Guirkinger and Aldashev (2016).

the Asian part of the Russian Empire (Olcott, 1995: 87). Six years after the enactment of this bill, in 1895 the Czarist government organized and financed the statistical expeditions into the Steppe that produced the first wave of data we use in this paper. Finally, after 1906 (the year of the start of Stolypin agrarian reforms), peasant resettlement became an imperial priority and turned into a fully-fledged colonization, aiming at maximizing the use of land resources throughout the empire.

As reported by Demko (1969), in 1897 the Russian-speaking population of the four Kazakh regions directly bordering with Russia (Ural'sk, Turgay, Akmolinsk, and Semipalatinsk) comprised 496 thousand people, corresponding to 20.6 per cent of the total population of these regions. Table 2 shows that this average figure hides a substantial province-level variation. In seven provinces that we study, the 1897 share of Russian-speaking population varied from 4 per cent (in Aktuybinsk province) to 55 per cent (in Omsk province) of total population.

By 1905 the Russian-speaking population of the above-mentioned four regions increased to 844 thousand people, corresponding to 28.9 per cent of the total population (Demko 1969: 211). This rapid increase in Russian presence implied the spreading of numerous small Russian communities, starting from province capitals. Around 1900 the concentration of Russian settlements was greatest in areas close to province capitals (Panel A, Figure 3). Over time, the density of settlements increased almost everywhere; however, it still remained highest in the vicinity of the province capitals (Panel B of Figure 3).

This massive in-migration both discouraged nomadic pastoralism and encouraged sedentary agriculture at winter stops, because the soil and climatic conditions at summer pastures hardly allowed any crop cultivation. On the one hand, the large-scale occupation of pasture lands and transhumance routes made nomadic pastoralism more difficult. In addition, Cossacks and Russian peasants transferred to Kazakhs certain knowledge and skills concerning crop cultivation and the relevant agricultural tools. Demko (1969) mentions that the example of Russian settlers induced numerous poor Kazakhs, particularly those with relatively small herds, to attempt crop cultivation.

Russian colonization also substantially modified the property rights on land. Until 1891, the land belonged legally to Kazakh tribes. The 1891 *Rulings Concerning the Administration of Akmola, Semipalatinsk, Semirechinsk, Ural'sk, and Turgay Regions* declared (in Article 119) that

the land occupied by nomads was the property of the State (Zimanov, 2005: 500-518). This regulation granted the Kazakhs with usufruct rights on the land that they occupied for pastures (Article 120); however these rights were regularly trampled by colonial settlers and could be easily revoked. The ruling officially gave the Kazakhs rights equivalent to those of Russian peasants (Article 11), but in practice the equality of rights applied only to Kazakhs who conducted full-time cultivation and only to land used for sedentary agriculture (Martin, 2001).

In short, both the fierce competition for land and the legal reforms accompanying it induced nomads to reduce their transhumance, both in terms of time and amplitude. These changes, triggered by colonization, generated large-scale repercussions in all spheres of social and economic life. We can trace these repercussions in documented changes in family and clan-level institutions, in particular those regulating access of individual households to resources. In what follows, we examine these adaptations in the management of summer pastures by clans (communes) and winter pastures and fields by extended families. For each of these dimensions, we describe changes over time (using our panel of provinces) and the correlation between the institutions and the geographic proximity to Russian settlements (using the extended-family dataset from the first wave). Next, we explore the potential economic mechanisms driving these changes.

3. Russian colonization and change in Kazakh family institutions

During Russian colonization the traditional institutions regulating access to resources in Kazakh families were deeply modified. This happened without planned interventions of colonial authorities: Czarist administration did not intend to regulate how Kazakh families organized themselves. These institutional changes were endogenous responses of Kazakhs to changes in their economic environment, which were in turn triggered by Russian settlements. More specifically, land rights became increasingly individualized: groups of individuals that enjoyed use rights on summer pastures and on specific parcels around the winter stops became smaller. Furthermore, joint production within the extended family gave way to more individual forms of cultivation based on nuclear households. We detail these changes below.

3.1. Organization of summer pastures

As explained above, summer pastures were jointly exploited by several extended families of the same clan who migrated from their respective winter stops to spend the summer together.

In historical documents, such a group of families is referred to as *obshchina* (a commune). While most clans constituted a single commune, certain larger clans contained two or more. During colonization, the size of communes considerably decreased, indicating that fewer families shared the same summer pastures. This has been highlighted by contemporary authors (Kuznetsov, 1910b) and is reflected in our data. Table 3 reports the average number of extended families by commune in each province of Akmolinsk region in the two waves of data. In all provinces the average commune size decreases substantially. On average, such decrease represents 1.7 extended families per commune (or 10.1 individual members) in less than 10 years. This decrease is clearly driven by increasing fragmentation of communes: the number of communes went up by 13 to 47 per cent, depending on province.

In line with the decrease in the size of communes, we also find that the size of clans decreased substantially. Table 4 compares the clan size distribution between the two waves of expeditions, in the five provinces of Akmolinsk region. We see that the total number of clans increased substantially across the two waves: in the second wave, depending on the province, 40 to 90 per cent more clans are enumerated by expedition interviewers. Looking across the size distribution, we observe that small clans (containing only 1 extended family) increase dramatically as a share of total clans, whereas large clans (federating 5 or more extended families) command a much smaller share. While there is substantial heterogeneity across provinces in the levels, the trends are quite similar across provinces.

The splitting of communes that we discussed above sheds light on this drastic change in clan identity over merely a decade. Remember that Kazakh clans are not disconnected units, but rather elements of a vast interconnected genealogical tree. When asked about his clan, an extended family head declared the branch/level of the genealogical tree with which the extended family members identified the most. If so, one explanation for the above pattern is that over the decade under study the extended families became more likely to identify with more recent ancestors in their clan genealogical trees, as this sub-group now constituted the commune.

This conjecture is confirmed by Martin (2001): “[Kazakhs] accommodated to the colonial presence by adopting hay reserves, shortening the length of their migrations, and fiercely guarding whatever land they could claim. By making these claims to land they were bringing about the division of a clan’s land holdings into smaller and smaller units, represented by individual *auls* [extended families] or groups of *auls* within a clan sub-lineage, suitable for

grazing of smaller herds” (Martin 2001: 80). In the same vein, Kuznetsov (1910b) writes: “The clan system is getting substantially weaker and a huge mass of *auls* [extended families] separate away from old clans into a separate, independent existence... The fall of the importance of the clan system that affects the restructuring of the economic and daily-life organization of Kazakhs is, in turn, clearly determined by various influences of the new living conditions [i.e. sedentarization] of Kazakh population” (Kuznetsov 1910b: 56). The speed of change in clan identity that we document goes against the conventional wisdom in economics that traditional institutions governing identity (e.g. lineages) can be considered as pre-determined and exogenous, at least at the scale of a lifetime (Akerlof and Kranton, 2000, Roland, 2004, Greif and Tabellini, 2015).¹²

3.2. *Organization of hay making and cultivation in winter stops*

Prior to colonization, the smallest unit that possessed property rights on winter stop land was the extended family that managed the pastures in a closed-access common-property regime. In contrast, at the time of the first-wave expedition, a large share of extended families had already allocated parcels to individual households within the extended family, for their private use. Specifically, our dataset possesses information on the rules regulating access of individual households (within the extended family) to plots used for haymaking. Three main types of rules were used. First, hay plots sometimes were the property of the extended family as a whole, and all households composing the family jointly exploited this land. At the other extreme, in some other families, the haymaking plots were owned by individual households. Finally, in certain extended families, households were allocated individual hay plots on yearly basis (every year the family re-allocated plots among its member households). Sometimes, within the same extended family, a subset of households adopted one rule (e.g. individual ownership of hay plots), whereas another subset exploited their hay plots jointly.¹³

Figure 4 presents the relative share of extended families with individualized hay plots and extended families with collective plots by deciles of distance to the provincial capital. This

¹² In contrast, recent work in political science (e.g. Posner, 2005, Chandra, 2012) provides examples and theories aiming at explaining similar identity changes in other contexts. See also Cassan (2015).

¹³ There was substantial diversity in the way in which the reallocation of hay plots occurred. Enumerators describe cases where the plots were allocated by a lottery, as well as cases when the extended family head had a final say on the allocation (Shcherbina 1902a: IX-X).

distance is a proxy for the intensity of Russian colonization, given the geographic pattern of diffusion of Russian settlements described above (see Figure 3).¹⁴ Individualized rights are more prevalent close to the provincial capital, with prevalence rate above 65% in the first two deciles and lower than 45% in the last two deciles. Table 5 confirms this correlation in a regression framework, controlling for province fixed effects and the size of the extended family.¹⁵ Column 1, for instance, indicates that a one standard-deviation increase in the distance to the provincial capital (154 *verstas*) is associated with a decrease of 12 percentage points in the prevalence of individualized hay plots. The speed of individualization in property rights suggested by the data is surprisingly high. Given that prior to the adoption of haymaking practice no individual rights on land existed, the data suggest that within a thirty-year period, nearly half of Kazakh extended families passed from the common-property regime to individual allocation of haymaking plots.¹⁶

This tendency towards individualization is confirmed by comparing aggregate data from the two waves of expeditions. Table 6 presents the statistics on the organization of haymaking in the three provinces for which we have comparable data in two waves of expeditions. There is a clear tendency towards the reduction of the common-ownership form and an increase in individualization of haymaking production.

This trend towards individualization of haymaking institutions is also confirmed by contemporary observers' accounts. Kuznetsov (1910b) writes: "Joint production of hay can be considered as a more perfect form of common use, under which one precludes the randomness in the allocation of quantity and quality of hay associated with the yearly re-allocation arrangement... [In several cases] we have registered the transition from common use of hay-making plots to the individual form in the last 7-8 years. The opposite cases of switching from

¹⁴ Theoretically, it is possible that the proximity to a city also has a direct effect, unrelated to colonization, on the changes that we document. For instance, rising demand for food from the city might affect the re-organization of crop production in nearby areas (von Thünen, 1826). This might, in turn, lead to changes in family organization. However, contemporary accounts clearly indicate that a von-Thünen mechanism was unlikely to be at work. Cities in the area under study were relatively small (see Table 2). More importantly, the production of grains by Kazakhs never exceeded their own consumption (*Obzor Akmolinskoi Oblasti za 1905 god*, 1906: 16). Finally, the cities were either self-sufficient in terms of provision of food or (the larger ones, such as Omsk and Petropavlovsk) were supplied by grains from outside the Kazakh steppes, e.g. by Tobolsk governorship in Southern Russia (*Obzor Akmolinskoi Oblasti za 1905 god*, 1906: 31).

¹⁵ Throughout the paper we use linear probability models with province fixed effects. The results are very similar with logit or probit regressions (results available upon request).

¹⁶ The median exposure to haymaking among the extended families in our data is 30 years.

the individual to the common-use form are extremely rare... Currently, one observes the strengthening of the tendency of some *auls* [extended families] and households to better consolidate the ownership of hay-making plots. These Kazakhs say: “The absence of boundaries is bad: lots of arguments and fights emerge during re-allocations, thus it is better that each one has his own plot’...” (Kuznetsov 1910b: 114-115).

Our dataset also contains information on the rules regulating labor allocation within extended families. Specifically we have data on household participation in the labor market and the composition of workforce involved in crop cultivation. The main variable of interest indicates whether an extended family practiced joint cultivation (“*supryaga*” in Russian) whereby each household had to provide a laborer for joint cultivation and the proceeds were divided among households.¹⁷

Regarding the participation in the labor market, our dataset contains information on whether households hired workers for various tasks and whether some household members worked outside their households. In this category we cannot distinguish between wage employment (for agriculture and livestock) and other activities (e.g. craftsmanship). Figure 5 plots the average of these variables for each decile of distance to the provincial capital. Joint crop cultivation is more common in the last deciles than in the first ones: in the first decile households relied on the joint-cultivation institution in 54% of extended families, while in the last decile this figure stood at 86%. Labor hiring for crop cultivation follows the opposite trend: it was more common in families closer to the capital (50% in the first decile) than in those further away (36% in the last decile). Labor hiring for haymaking was also more common in the first deciles than in the last ones (although the decrease is neither very steep nor monotonous). In the case of husbandry, our dataset contains information about whether some households of the extended families were hiring workers on yearly basis. This variable shows again a greater level of development of the labor market closer to the province capitals and a clear gradient as we move away: in the first decile 50% of extended families include households who rely on these

¹⁷ Joint cultivation is different from the collective ownership of hay plots introduced above. In the latter case, the information explicitly refers to individual / collective ownership of *land*, while in the former case, the information concerns *labor* allocation. The two are clearly related, as collective haymaking plots implied that households worked on them jointly (as described in the published volumes of the expeditions). The reverse, however, is not necessarily true: the description of the joint crop cultivation suggests that, in certain cases, crop fields were the individual property of households.

contracts, while in the last decile this figure is 38%. Finally, the supply of labor follows a similar trend with 70% of extended families including members who work for a wage (or have a small business) in the first decile and 58% in the last decile. Comparing the level of hiring and of the supply of labor indicates that some extended families both demanded and supplied labor: summing the share of families hiring labor for haymaking to the share of families supplying labor exceeds 100%.

Table 7 confirms in a regression framework that labor markets were more active closer to the provincial capitals while the joint cultivation of crops by households of the same extended families was more widespread further away from the capital (controlling for province fixed effects and family size). Thus, the prevalence of joint crop cultivation in extended families increase by 5 percentage point on average when the distance to the province capital increases by one standard deviation (column 1), while the prevalence of hiring for crop cultivation simultaneously decreases by 17 percentage points.

For changes over time along this dimension, we have consistent information only for two provinces (Kustanay and Aktyubinsk). Table 8 presents the statistics on joint cultivation and the development of labor-contract institutions in the period under study, for the two provinces, at the household level.¹⁸ The first column indicates that the share of households engaged in joint cultivation with other households of their extended family decreases over time from 61% to 42% in Kustanay and from 57% to 50% in Aktyubinsk. Simultaneously, the share of households hiring labor for cultivation increases in Kustanay from 16% to 26% (the information is not available for Aktyubinsk in the second wave). Hiring labor for haymaking also becomes more prevalent in Kustanay province (and does not change over time in Aktyubinsk). The share of long-term contracts grows: among the households that hire workers, the share of those offering yearly contracts increases (from 48 to 84% and from 40 to 73%). The average number of yearly employees also increases substantially. Finally, the share of households with members working for a wage or engaged in craftsmanship rises (from 31 to 47% and from 32 to 37%).

The evidence presented in this section suggests that during Russian peasant colonization land- and labor-allocation institutions within Kazakh extended families underwent substantial

¹⁸ Although the unit of observation is an extended family, the dataset contains information on the number of households within the extended family that use the various types of labor contracts. This allows us to construct the descriptive statistics at the household level.

changes. Joint land ownership and joint organization of labor gave way to more individual modes of production. At the same time, labor contracts started to develop for tasks that traditionally were accomplished almost exclusively within the extended family and did not involve monetary payments. Next, we turn to economic mechanisms through which colonization may have triggered these changes.

4. Economic mechanisms

Economic theory proposes several mechanisms to explain the individualization of the organization of production, at the community and family level, as well as the consequences of such individualization for the organization of labor. Two main channels behind individualization are the increase in population density and the intensification of production technology. We argue that in the context of our study, both of these channels play an important role. Moreover, the changes that we observe concerning the development of the labor market are consistent with the leading theoretical explanations.

4.1. Increase in population pressure

There exists a large literature on the individualization of property rights on land that stresses the role of population pressure on the emergence of private property rights (the so-called “property rights school”; see Demsetz, 1967, Johnson, 1972, Platteau, 1996). The key argument is that growing competition from the increasing population raises the incidence of externalities in the common-property arrangement, and thus increases the relative attractiveness of the more efficient private property-rights regime. These externalities can take the form of over-exploitation of limited natural resources or under-provision of public goods. Guirkingner and Platteau (2015) formalize this argument in the context of family farms in developing countries. In a principal-agent framework, they show that increasing land scarcity forces the patriarch/principal to divide the family farm into smaller units (headed by his sons) because of the growing efficiency cost of free-riding under team production.

In our context, large-scale Russian in-migration into Kazakhstan led to the blocking of numerous transhumance routes of nomads and to a stronger competition for land on winter pastures. The competition for land became severe enough to trigger multiple land disputes among Kazakh clans (Sedelnikov, 1907, Martin, 2001). Thus, the population pressure mechanism may help explain the choice of Kazakh extended families to individualize part of their collective land.

Our data provides indirect evidence suggesting that Russian settlements increased pressure on land at winter pastures. While we cannot compute a direct measure of pressure, we can show that the population of winter stops (or the size of extended families) was larger in the vicinity of Russian settlements and that this population increased across survey years. If winter pasture was not more abundant in the vicinity of Russian settlements and if the land endowment of winter stops did not increase over time, the population trends suggest that Kazakh population density was larger in areas where more settlers were present. Although we cannot formally rule out that land managed by a given extended family increased, such hypothesis would run against all descriptions of the increasing competition of Kazakhs for pasture land during colonization. Furthermore, for a sub-sample of extended families (in two provinces), we have a proxy for the size of land endowment at winter stop that suggests that it was not larger in areas where the families exploiting it were bigger. This proxy is the distance from the dwellings to the furthest haymaking parcel (remember that haymaking was nearly universal), which should be positively correlated with the total size of a winter stop.

Figure 6 presents the average number of nuclear units within the extended family, the average unit size and the average distance to the furthest haymaking parcel, by decile of distance to the provincial capital. It indicates a clear decrease in family size as the distance grows: in the first decile extended families count on average more than 2 additional households as compared to the last decile. This increase in the number of households should translate into a higher pressure on land, since the average *household* size remains similar across deciles and the distance to the furthest parcel is not larger in winter stops closer to the province capital. Table 9 reports the results of simple regressions where the dependent variable is the total size of the extended family (i.e. the number of members) and the key variable of interest is the distance to the province capital. Columns 3 and 4 include additional control for the distance to the furthest parcel. Our estimates suggest (column 1) that a one standard-deviation increase in the distance to the province capital is associated with a decrease in the size of the extended family by 5.9 individuals. This effect equals 10.7 individuals in the two provinces where we add the proxy control for land endowment.¹⁹

¹⁹ The increase in the size of the effect is not driven by this additional control, but by restricting the sample. The coefficient remains remarkably similar if we drop the “furthest-parcel” control (the estimation results are available upon request).

Turning to the change across time captured by the panel of provinces, Table 10 reports the distribution of extended families by size ranges (1 to 5 units, 6 to 10, 11 to 15, 16 to 20, 21 to 30, 41 to 50 and more than 50)²⁰ in each province over time. Comparing the results of the two waves of data shows a rightward shift in the distribution, whereby the total number of households in the first (and sometimes second) category strictly decreases while the number of households in the larger size category increases. For instance, in Petropavl province, an average extended family in 1901 contained 8.6 households and 50.4 individuals, whereas 7 years later, these measures went up to 9.2 households and 53.9 individuals. This rightward shift in the size distribution of families can also be seen on Figure 7, which depicts the 1901 and 1908 cumulative distributions for this province. Notice instead, on Figure 8, that there is no change in the size of nuclear households, suggesting that the observed change in extended family size is not a demographic (i.e. fertility-driven) one.

The data from Petropavl province allow us to dig deeper into understanding the increase in the size of extended families and indicate that this increase is likely driven by less frequent splits when families become larger. For this province, we can match extended families in the data across the two waves. Table 11 reports the results of this matching. Columns 1 and 2 present the breakdown of the first-year data into: (a) extended families that neither merged nor split across the two waves; (b) extended families that merged with other extended families; (c) extended families that split into separate families; and (d) extended families that are not found in the first wave. Columns 4 and 5 report the breakdown of the second-year data into categories (a), (b), (c), (e) families that are only in the second wave, and (f) families for which we could not find the counterpart in the first wave. The table indicates that the majority of families falls into the first category (68% of the first year data) and that there are relatively few merges (7% of the first year data). This table also shows that the increase in the size of extended families does not result from a selection process whereby smaller families migrated out. While extended families that have disappeared in the second wave are slightly smaller, this difference cannot account for the overall increase in family size over time.²¹ The most plausible explanation for this increase must then be that family splits become less frequent.

²⁰ These categories are the ones recorded in the expedition originals in the aggregate data.

²¹ The average number of households in an extended family in the first wave remains very similar if we ignore this category (it increases from 8.6 to 8.7 units).

To summarize, our data confirms that land became scarce in areas densely populated by Russian settlers. Land scarcity worsens the externalities of collective farming highlighted in the literature (see above). This may have triggered Kazakh extended families to opt for a distribution of parcels for haymaking to individual households, breaking with the traditional collective use of pastures. Another consequence of growing land scarcity (and of the proximity of Russian farmers) is the change in the production technology and the adoption of new techniques by Kazakh pastoralists. As discussed in the next section, this change towards a more intensive use of land provides another rationale for the individualization of property rights.

4.2.Intensification of production technology

Technological change, itself induced by population pressure, may also favor individualization of property rights as a means of internalizing increasingly costly externalities. This argument is at the heart of Boserup (1965) classic explanation of the rise of peasant farms (see Binswanger and Rosenzweig, 1986, and Binswanger and McIntire, 1987, for formal models). The idea is that land pressure induces a shift towards land-saving and labor-using techniques and that these techniques typically involve conservation investments that are better encouraged by privatized land rights. Another important characteristics of these techniques is that they typically require care-intensive practices, in the sense that labor quality and work conscientiousness become crucial to the production process (Hayami and Otsuka, 1993). Monitoring costs associated with collective production subsequently increase, which raises the net benefit of splitting extended family farms into smaller units where fewer workers are residual claimants (Guirkinger and Platteau, 2016). Another mechanism for technology-induced individualization is mentioned in the literature on farming cooperatives and relies on the economies-of-scale argument (Putterman, 1989, Putterman and DiGiorgio, 1985). If the new technology involves less economies of scale than the previous system, incentives to individualize are strengthened. Finally, some authors have examined this question within the framework of collective household models. Foster and Rosenzweig (2002) develop a model to account for the increase in family-farm splits following the Green Revolution in India. In their model, individual members have heterogeneous preferences and technological change exacerbates intra-family heterogeneity in productivity leading to stronger disagreements over consumption allocations. *Ceteris paribus*, this increases the propensity of a family farm to split into smaller units, leading to more individualized form of land use. Bardhan et al. (2014) study the effects of land reforms on family-farms divisions. In

contrast with Foster and Rosenzweig (2002), they predict that technological change would reduce the rate of family-farm divisions. This is because they focus on the incentive problems of collective production and in their case, the main effect of technological change is to relax land-scarcity and thereby the efficiency cost of free-riding.

In our context, the adoption of more labor-intensive production systems was clearly under way. During colonization, two key technological changes (pushing towards a more intensive use of land) transformed nomadic pastoralism. The first was the practice of haymaking, consisting in cutting natural grass, drying and storing it to feed livestock during the cold season. The type and amount of labor required for haymaking are very different from those needed for supervising the grazing on natural pastures. While large economies of scale are realized by herding jointly the livestock of several households on natural grazing pasture, diseconomies of scale may arise in the management of a team of workers making hay for several households, in particular if these households possess herds of widely different sizes.

Second, crop cultivation gradually became an important economic activity for Kazakh families. The argument developed above holds for crop cultivation based on plowing, and the advantages of collective land use of the extensive grazing system are lost under this new activity. In fact, Boserup's (1965) explanation for the shift to farming based on the nuclear household rather than on the extended family relies on a comparison between societies using the plough and societies using more extensive forms of land use.

Our data allows to quantify these changes and to relate the gradual expansion of hay-making and agriculture to the geographical proximity of Russian settlements. Figure 9 breaks down the sample by decile of distance to the province capital and plots, for each decile, the share of extended families that cultivate crops, the number of years since they started cultivating, and the share of extended families that produce hay. We observe a monotonic decrease in the fraction of cultivating families, from 0.85 in the first decile to 0.45 in the last one. Similarly, the experience of cultivation is longer in areas closer to the province capital. Finally, production of hay is nearly universal in the first 6 deciles, whereas it is present in about 80% of families in the last two deciles.

Regression analysis confirms these findings. Table 12 reports the results of OLS regressions at the extended-family level for the propensity to cultivate (columns 1 and 2) and the

propensity to produce hay (columns 5 and 6). Columns 3 and 4 report the marginal effects of Tobit regression; the dependent variable is the number of years that the extended family has been cultivating. The distance to the province capital has a large and significant impact on all the three variables, even after controlling for the size of the extended family (measured by the number of nuclear households it contains) and adding province fixed effects. Similar results obtain when we replace the distance to capital (in *verstas*) by log distance. The results in columns 2, 4, and 6, for example, suggest that one standard deviation increase in the distance to the province capital (154 *verstas*) reduces the propensity of a Kazakh extended family to cultivate by about 15 percentage points, the average number of years of cultivation by about 7 years, and the propensity to produce hay by about 15 percentage points.

Turning to the panel of provinces (in Akmolinsk region), the comparison between the first-wave and the second-wave production patterns confirms that a transformation of the production system was clearly under way. Table 13 indicates that in nearly all the provinces the total number of haystacks produced increased substantially over the period between the two waves (by 60% for the whole region). Crop production, measured by the total area devoted to cultivation, also increased substantially: the area cultivated increased by 54% for the whole region. This area grew in all provinces, with the exception of Kokchetav. In Kokchetav and Atbasar provinces the share of households cultivating somewhat declined. Kuznetsov (1909, 1910c) explains that in these two provinces there was a large heterogeneity in the change of share of cultivating households, between the two waves. In districts where land was more suitable for agriculture, Kazakhs intensified the cultivation of crops. Contrarily, in areas with poor land suitability, the “early starter” households realized that crop cultivation was not profitable and thus gave up cultivation. On average, these two tendencies amounted to an aggregate decrease in the share of cultivating households.

Summarizing, we see that the tendencies concerning intensification of technology go in the same direction as those on increasing land pressure. Both of these (not mutually exclusive) forces have likely contributed to the choice to individualize the modes of land use.

4.3. Development of labor markets

During Russian colonization, the decreasing importance of collective production is accompanied by an increased reliance on hired labor. In fact, the picture emerging from the description of the

labor market is that of a very active one. Incidentally, the contrast with the contemporary situation in rural areas of Russia is striking. Chayanov (1925) reports that more than 90% of farm households in pre-1917 Russia relied exclusively on family labor (i.e. household labor) for farming and neither hired nor supplied laborers for working on other peasants' farms. This difference is even more puzzling, given that in the nomadic Kazakh system, households' access to land resources was based on collective holdings and thus, intuitively, more egalitarian. What kind of labor contracts were these? Table 14 presents the examples of contract details, on the basis of descriptions collected by the expedition members.²² Two interesting facts emerge. First, the contracts implied a substantial part of the compensation paid in cash (Russian rubles). The in-kind part of the payment mostly involved working clothes provided to the worker, but sometimes also dairy and meat products. Second, the compensation of labor mostly employed in agriculture and livestock herding was definitely lower than that of wholesale traders, but higher than that of self-employed shuttle traders.

Compared to the large literature on the emergence of private property rights for land, the literature describing the mechanisms behind the emergence of labor markets in agriculture is scant. There are some historical accounts of the simultaneous privatization of land for common use and the development of agricultural labor markets. A key reference there is Allen's (1992) analysis of the enclosure movement in England in the 15th-19th centuries. As small farmers lost access to the common that became part of private estates, they could not raise livestock anymore and thereby lost an important source of income. They had to increase their reliance on wage labor which was demanded by the new large estate owners. Allen argues that small farmers heavily lost from enclosure. The literature on land privatization provides theoretical support for the potential negative consequences for those excluded from the common property resource and who subsequently work for the new private owner of the resource for a wage (see Weitzman, 1974; Baland and Platteau, 1998, Baland and Bjorvatn, 2013).

²² This table is constructed using the descriptions of typical contracts in Petropavl province, documented by Shcherbina (1908: 217-219). As explained by the head of the first-wave expedition, the earnings of workers were noted by the interviewers on numerous occasions, but these materials were not developed further, and thus did not enter systematically into the published materials of the expedition. Pp. 217-219 of Shcherbina (1908) nevertheless provide examples of typical contracts and earnings for most common professions.

Our data does not directly indicate whether the distribution of individual hay plots to households (or the split of communes) deprived some households composing the extended family of access to resources so that they had to increase their reliance on wage labor. Even in the absence of such exclusionary process however, the distribution of individual plots may have stimulated the development of a labor market as land-to-labor ratios were bound to be heterogeneous across households (even if the allocation rule was defined on a per-capita basis, differences in fertility across households quickly lead to different land-to-labor ratios). Relatively land-abundant households may have hired workers from relatively land-scarce households. Our data provides some evidence consistent with the existence of a labor market within the extended family, whereby poorer households would be employed by richer ones: 72% of extended families include both households who supply hired labor and households who hire workers. Historical accounts describe how richer households employed individuals from poorer households to work on the farms of the former (Martin, 2012: 78-79) and this is confirmed by our data. Figure 10 indicates a clear wealth gradient in the participation in agricultural labor market: rich households (as measured by livestock ownership) tend to hire workers while poorer households tend to supply workers. As extended families usually contained both poor and rich households, it is not surprising that they consist of both labor-supplying and employing units. In fact, wealth heterogeneity within extended families was clearly larger than that across extended families, as Figure 11 illustrates. This figure compares the distribution of households by wealth categories (measured in adult horse equivalent) to the distribution of average family wealth (in adult horse equivalent by household) and indicates that the former distribution is substantially wider than the latter one.

Importantly, although a part of the labor contracts were likely established between households of the same extended families, some labor contracts must have stretched beyond extended family boundaries. In fact, in two Western provinces (Aktyubinsk and Kustanay), 18% of extended families include only households who hire workers and 10% include only households who supply workers. Furthermore, in about 25% of extended families, the number of workers hired exceeds the number of men who are either working for a wage or are craftsmen. This implies that more than 25% of extended families did (also) employ workers from other extended families.

The development of labor relationships across extended families suggests another (complementary) mechanism for the deepening of the labor market observed in the data. The

emergence of novel economic opportunities offered by the development of new markets may have transformed family-based labor-exchange institutions (akin to patron-client institutions) that prevailed in the traditional nomadic economy. Such economic opportunities included working as hired agricultural workers (e.g. shepherds or hay-makers) for rich households outside one's extended family or even clan, but also as professional craftsmen and craftswomen (e.g. blacksmiths, carpenters, brick-makers, etc.) in the semi-sedentary economy that involved higher specialization of labor. In fact, Platteau (1995) argues that the replacement of patron-client relationships by wage contracts in Asia in the 20th century was, in several contexts, driven by the existence of outside opportunities for clients. The increase in the bargaining power of the client forced the patron to change their labor strategies, possibly towards monetized labor contracts. An agricultural wage labor market then developed. Interestingly, Platteau (1995) reports that the new labor contracts were more likely to take the form of "regular farm labor contracts" (similar to the yearly contracts observed here) in the technologically advanced Indian villages of the "Green Revolution Belt".

In short, two mechanisms (that are not mutually exclusive) may help explaining the development of the labor market as Kazakh extended families increasingly relied on intensive land use and gradually individualized their winter pastures. First, the individualization of the collective hay fields may have created new opportunities for labor exchange between relatively labor-abundant and labor-scarce households. Alternatively, poor households may have lost access to hay parcels in the privatization process, thereby becoming unable to make a living out of raising their livestock and resorting to working for richer households from their extended families or from other extended families. Second, the emergence of new opportunities triggered a transformation of the labor-exchange relationship prevailing among Kazakh households towards regular wage contracts. Poorer households who could work for a wage outside of the extended families may also have negotiated a wage when they worked for households of their extended family.

5. Conclusion

Large-scale colonial settlements often implied sharp changes in the constraints faced by indigenous populations. On the basis of evidence from the late 19th – early 20th century Kazakhstan, this paper shows how Russian peasant colonization (in particular, through the

increase in land pressure and the transfer of agricultural technology) brought along changes in the traditional family and clan-level institutions of the Kazakhs.

The causes of the transition from traditional family and clan institutions to nuclear structures that rely on individualized property rights and labor markets is a major question in the literature on long-run comparative development. While there are a few qualitative descriptions of the processes of individualization at the community level, it is unique to have quantitative micro-level data on this type of rules within extended families, in a systematic way across time and space.

We argue that two mechanisms mentioned in the literature aiming at explaining endogenous land privatization processes is relevant in our context. First, population density (and thus land scarcity) was increasing as a result of Russian peasant migration. Consequently, the externalities related to collective land use may have become increasingly costly for Kazakh pastoralists. Second, technological change was under way and more land-intensive systems were introduced. To the extent that these new techniques involved fewer economies of scale, required more investments and/or were more care-intensive, a more individualized use of land endowment was probably more efficient. Turning to the development of labor markets, we suggest that the increasing reliance on hired labor may be a consequence of the exclusion of marginal households from the distribution process and the result of a transformation of traditional labor-exchange institutions. As new outside opportunities developed, wage employment within and beyond the extended family may have gradually replaced the pre-existing patron-client arrangements.

We believe that an important contribution of this paper is in highlighting the speed of change in these traditional institutions. Conventional wisdom among development economists (see, e.g. Roland 2004, LaFerrara 2011) is that family and kinship institutions change very slowly. This is why often researchers have assumed them to be constant when studying the effect of the changes in the economic environment on individual economic behavior, constrained by family-level or kinship-level arrangements. This study provides an example of a setting where these rules evolved considerably within a single generation.

Our study also complements the work of economic historians on Czarist Russia. Most of the studies (for example, Nafziger, 2010; Dennison, 2011; Chernina, Dower, and Markevich, 2014; Markevich and Zhuravskaya, 2015) focus on the institutional changes in the early 20th-

century Russia. Despite the fact that Russia was one of the largest colonial empires, scarce attention has been paid to the economic history of Russian colonization (one exception is Natkhov, 2015). We hope that this paper, as well as our earlier contributions (Aldashev and Guirking, 2012, and Guirking and Aldashev, 2016), help to opening a new strand of literature focusing on the consequences of Russian colonization for the development trajectories of Central Asian economies.

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Table 1: Descriptive statistics for the dataset of extended families

Variable	Definition	Mean	S.D.	Min	Max	N
Number units	Number of nuclear units in extended family	7.43	5.93	0	101	10234
Household size	Average size of households composing the extended family	5.94	1.47	0	22.5	10168
Family size	Size of extended family	47.32	41.22	0	646	11230
Distance	Distance to province capital in versta (1.5 km)	177.55	154.03	0	900	11097
Hay	=1 if extended family makes hay	0.94	0.24	0	1	11347
Hay distance	Distance to furthest hay parcel in versta (1.5 km) – defined when hay=1	4.32	5.18	0	65	6434
Individual hay	=1 if at least some households of extended family own individual hay plots (defined when hay=1)	0.53	0.50	0	1	8564
Collective hay	=1 if (some) households of same extended family have impartible ownership over hay plots (defined when hay=1)	0.47	0.50	0	1	8721
Hired hay	=1 if labor hired for hay making by at least one household in extended family (defined when hay=1)	0.49	0.50	0	1	10620
Cultivate	=1 if extended family cultivate crops	0.61	0.49	0	1	11217
Number years cultivating	Number of years since the extended family started cultivating	6.61	13.13	0	300	6015
Joint cultivation	=1 if at least some households jointly cultivate crops (defined when cultivate=1)	0.71	0.45	0	1	6185
Hired crop	=1 if labor hired for crop cultivation by at least one household in extended family (defined when cultivate=1)	0.39	0.49	0	1	5403
Yearly contract husbandry	=1 if labor hired on yearly basis for husbandry by at least one household in extended family	0.37	0.48	0	1	9696
Working out or business	=1 if at least one member of extended family working out for wage or has a business	0.66	0.47	0	1	11270

Note: The variable *Number years cultivating* is only available for two provinces. Differences in the number of observations come from missing values that largely correspond to variables printed in columns close to book spine in original volumes. The sections of the pages corresponding to these variables were scanned only partially, as full scanning would require the destruction of the original books.

Table 2: Ethnic composition of population in seven provinces under study (1897 census)

Province	Total population	Russians, Ukrainians, and Belorussians	Kazakhs	Other	As a share of total population		
					Russians, Ukrainians, and Belorussians	Kazakhs	Other
Omsk	100539	55169	38185	7185	0.55	0.38	0.07
of these, in province capital	37376	33042	505	3829	0.88	0.01	0.10
Akmolinsk	185058	14520	166343	4195	0.08	0.90	0.02
of these, in province capital	9688	4728	3020	1940	0.49	0.31	0.20
Atbasar	86413	11081	74728	604	0.13	0.86	0.01
of these, in province capital	3038	2273	232	533	0.75	0.08	0.18
Kokchetav	155461	67548	79041	8872	0.43	0.51	0.06
of these, in province capital	4962	3490	800	672	0.70	0.16	0.14
Petropavl	155137	77323	69092	8722	0.50	0.45	0.06
of these, in province capital	19688	10600	334	8754	0.54	0.02	0.44
Aktuybinsk	115215	4265	109585	1365	0.04	0.95	0.01
of these, in province capital	2817	2278	96	443	0.81	0.03	0.16
Kustanay	152556	29347	118022	5187	0.19	0.77	0.03
of these, in province capital	14275	11603	463	2209	0.81	0.03	0.15

Source: First All-Russian Population Census of Russian Empire, vol. 81 (Akmolinsk Region), pp. 2-3; and vol. 84 (Turgay Region), pp. 2-3

Table 3: Change in the size of communes (groups of extended families sharing the same summer pastures), by province

Province	Year	Number of communes	Extended families per commune
Akmolinsk	1896-1900	308	5.0
	1909	443	3.7
Atbasar	1897	122	5.0
	1909	162	4.3
Kokchetav	1896	336	4.9
	1907	679	2.6
Omsk	1901	151	5.4
	1908	228	3.6
Petropavl	1901	270	4.9
	1908	397	3.4

Table 4: Change in clan identification, by province (1896-1909)

Province		Clans in wave 1				Clans in wave 2			
		Total	With 1 extended family	Federating from 2 to 5 extended families	Federating more than 5 extended families	Total	With 1 extended family	Federating from 2 to 5 extended families	Federating more than 5 extended families
Akmolinsk	Freq.	417	127	212	78	589	300	233	56
	Share		<i>0.30</i>	<i>0.51</i>	<i>0.19</i>		<i>0.51</i>	<i>0.40</i>	<i>0.10</i>
Atbasar	Freq.	122	32	45	45	169	70	65	34
	Share		<i>0.26</i>	<i>0.37</i>	<i>0.37</i>		<i>0.41</i>	<i>0.38</i>	<i>0.20</i>
Kokchetav	Freq.	354	90	163	101	558	261	204	93
	Share		<i>0.25</i>	<i>0.46</i>	<i>0.29</i>		<i>0.47</i>	<i>0.37</i>	<i>0.17</i>
Omsk	Freq.	108	22	46	40	198	75	83	40
	Share		<i>0.20</i>	<i>0.43</i>	<i>0.37</i>		<i>0.38</i>	<i>0.42</i>	<i>0.20</i>
Petropavl	Freq.	201	37	82	82	386	151	174	61
	Share		<i>0.18</i>	<i>0.41</i>	<i>0.41</i>		<i>0.39</i>	<i>0.45</i>	<i>0.16</i>

Table 5: Correlation between individualization of hay parcels within the extended family and distance to province capital (at extended-family level, with province fixed effects)

	(1)	(2)	(3)	(4)
	individual hay	individual hay	collective hay	collective hay
distance	-0.0008*** (-13.72)		0.0005*** (9.32)	
Ln(distance)		-0.0355*** (-6.98)		0.0300*** (5.91)
# units	0.0012 (1.24)	0.0028*** (2.86)	-0.0002 (-0.24)	-0.0011 (-1.18)
N	7404	7404	7558	7558

t-statistics in parentheses * p<0.10 ** p<0.05 *** p<0.01

Table 6: Changes in property rights over haymaking plots in extended families, by province

Province	Year	Individual hay	Yearly reallocation	Strictly collective hay	Mixed (at least two forms coexist in same extended family)
Akmolinsk	1896-1900	0.49	0.04	0.30	0.07
	1909	0.55	0.11	0.23	0.11
Atbasar	1897	0.34	0.06	0.55	0.01
	1909	0.45	0.14	0.28	0.13
Petropavl	1901	0.37	0.43	0.14	0.02
	1908	0.40		0.60	

Notes: We have the information for both years only in three provinces. The categories are defined only for families making hay. The shares do not sum up to one in the first year as for some families making hay the variables are not defined (3% of the cases). In most of these cases (82%) it is the first year that hay is prepared so that the institutional arrangement governing hay plot allocation may not be defined yet.

Table 7: Correlation between labor allocation and distance to province capital (at extended-family level, with province fixed effects)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Joint cultivation	Joint cultivation	hired labor crop	hired labor crop	hired labor hay	hired labor hay	yearly contract husbandry	yearly contract husbandry	working out wage or business	working out wage or business
distance	0.0003*** (4.35)		-0.0011*** (-16.84)		-0.0004*** (-7.47)		-0.0002*** (-4.64)		-0.0003*** (-10.16)	
Ln(distance)		0.0308*** (5.86)		-0.0688*** (-12.88)		-0.0088** (-2.30)		-0.0185*** (-4.67)		-0.0088*** (-2.79)
# units	0.0125*** (13.26)	0.0123*** (13.17)	0.0117*** (12.10)	0.0129*** (13.28)	0.0195*** (22.87)	0.0203*** (23.95)	0.0153*** (18.73)	0.0155*** (19.29)	0.0230*** (31.69)	0.0239*** (33.18)
N	5191	5191	5106	5106	9443	9443	8337	8337	9989	9989

t-statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01

Table 8: Change in joint cultivation and labor markets for Kustanay and Aktyubinsk provinces

Province	Wave	Among HHs cultivating		Among HHs making hay	Share of HHs	Among HHs hiring for husbandry		Share of HHs
		Joint cultivation	Hiring crop	Hiring hay	Hiring husbandry	Yearly contract husbandry	# workers on yearly contract	Working for wage or w/ business
Kustanay	1	61%	16%	13%	29%	48%	1.004	31%
	2	42%	26%	26%	24%	84%	1.805	47%
Aktyubinsk	1	57%		27%	42%	40%	1.396	32%
	2	50%	23%	26%	36%	73%	1.627	37%

Note: The information reported here is available only for these two provinces.

Table 9: Extended family size and distance to the province capital

	(1)	(2)	(3)	(4)
	family size	family size	family size	family size
distance	-0.038*** (-13.00)		-0.050*** (-8.41)	
Ln(distance)		-1.485*** (-5.27)		-1.400*** (-3.43)
hay distance			0.578*** (6.01)	0.620*** (6.42)
N	10978	10978	6411	6411

Note: t-statistics in parentheses, * p<0.10 ** p<0.05 *** p<0.01.

Table 10: Change in the size distribution of extended families, by province (1896-1909)

Province	Year	Extended families with __ household units								Total
		1-5	6-10	11-15	16-20	21-30	31-40	41-50	>50	
Akmolinsk	1896-00	421	675	277	87	52	11	2	0	1525
	1909	419	645	336	124	69	18	2	4	1617
Atbasar	1897	208	231	114	34	17	3	1	1	609
	1909	178	280	142	61	38	1	2	1	703
Kokchetav	1896	694	617	214	64	43	9	4	1	1646
	1907	607	637	307	121	55	19	5	5	1756
Omsk	1901	274	224	108	69	20	5	1	0	701
	1908	218	262	156	78	52	16	3	0	785
Petropavl	1901	457	495	219	64	48	18	0	3	1304
	1908	343	512	285	112	78	15	8	4	1357

Table 11: Matching of extended family in Petropavl province over the two waves of the panel

	1901			1908		
	(1) Freq.	(2) Percent	(3) Average units	(4) Freq.	(5) Percent	(6) Average units
Extended families that:						
Did not split nor merged	907	67.94	8.5	907	65.58	9.9
Split between 1901 and 1908	188	14.08	10.7	396	28.63	8.6
Merged between 1901 and 1908	89	6.67	6.3	43	3.11	14.9
Existed only in 1901 data	151	11.31	7.7			
Appeared in 1908 data				24	1.74	7.7
Unable to match				13	0.94	10.8
Total	1335	100	8.6	1383	100	9.7

Table 12: Distance to province capital and adoption of more land-intensive techniques (at extended-family level, with province fixed effects)

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	Tobit	Tobit	OLS	OLS
	cultivate	cultivate	# years cultivating	# years cultivating	hay	hay
distance	-0.001*** (-33.77)		-0.045*** (-29.47)		-0.001*** (-63.93)	
Ln(distance)		-0.058*** (-18.64)		-1.367*** (-14.55)		-0.016*** (-10.38)
# units	0.012*** (17.27)	0.015*** (20.52)	0.238*** (11.10)	0.412*** (18.31)	0.000 (0.91)	0.003*** (8.23)
N	9861	9861	5747	5747	9988	9988

Notes: t-statistics in parentheses, * p<0.10 ** p<0.05 *** p<0.01. For tobit, reported coefficients correspond to marginal effects at mean. The variable # years since started cultivating is only available for two provinces. The difference in the number of observations for the number of extended families plowing and making hay is due to the fact that some pages in the archives were not readable.

Table 13: Change in the production system, by province (1896-1909)

Province	Year	Haystacks produced, mln	Number of HHs that cultivate	Share of all HHs that cultivate	Total area cultivated for crops, thousand desyatinas
Akmolinsk	1896-1900	2.56	7192	0.53	19.55
	1909	2.65	8821	0.54	22.55
Atbasar	1897	1.20	3492	0.67	5.79
	1909	1.70	3785	0.55	7.07
Kokchetav	1896	1.46	2782	0.22	5.59
	1907	1.87	3027	0.19	4.69
Omsk	1901	0.98	206	0.03	0.53
	1908	2.14	2338	0.27	5.43
Petropavl	1901	0.93	2688	0.24	5.91
	1908	3.26	5812	0.44	15.42

Table 14: Examples of labor contracts and self-employment (Petropavl province, 1901)

Labor contracts				
<i>Type of contract</i>	<i>Occupation</i>	<i>Total salary</i>	<i>Part in cash</i>	<i>Part in kind</i>
Annual	Agricultural worker (<i>batrak</i>)		60 rubles	1 shirt, 1 pair of trousers, 1 pair of boots
Annual	Agricultural worker (<i>batrak</i>)	49 rubles	19 rubles	Clothes worth 30 rubles
Annual	Agricultural worker (<i>batrak</i>)		30 rubles	Clothes
Seasonal (6 months)	Haymaking and livestock breeding	56 rubles	50 rubles	Clothes worth 6 rubles
Seasonal (30-40 days)	Mower	19 rubles (on average)	15-20 rubles	Clothes, depending on in cash part; plus some livestock or food products
Annual or seasonal (winter)	Shepherd	66 rubles (on average, annual)	36 rubles	Clothes worth 30 rubles; plus abundant food products
Seasonal	Woodcutter	20 rubles (on average)	20 rubles	None
Self-employed				
Shuttle trader		33 rubles (on average, per season)		
Wholesale trader		200 rubles		

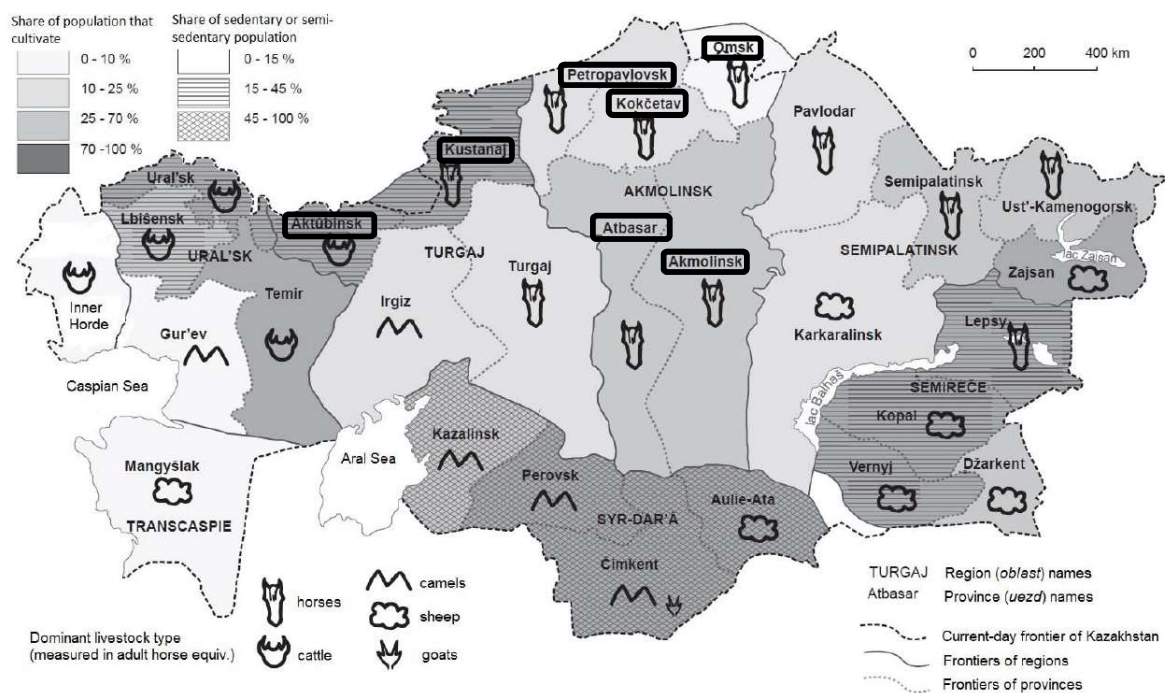


Figure 1: Administrative structure of Kazakhstan at the end of the 19th century

Source: Ferret (2014), Map 2.

Notes: The names of seven provinces in our dataset are marked with thick-line rectangles. Provinces marked in darker colors exhibit higher share of Kazakh population that cultivated crops. Provinces marked with more dense dashed lines exhibit higher share of Kazakh population that stopped being fully nomadic. Symbols in the center of each province indicate the main livestock type on which the Kazakh population of the province relied.

(De facto) Property rights:

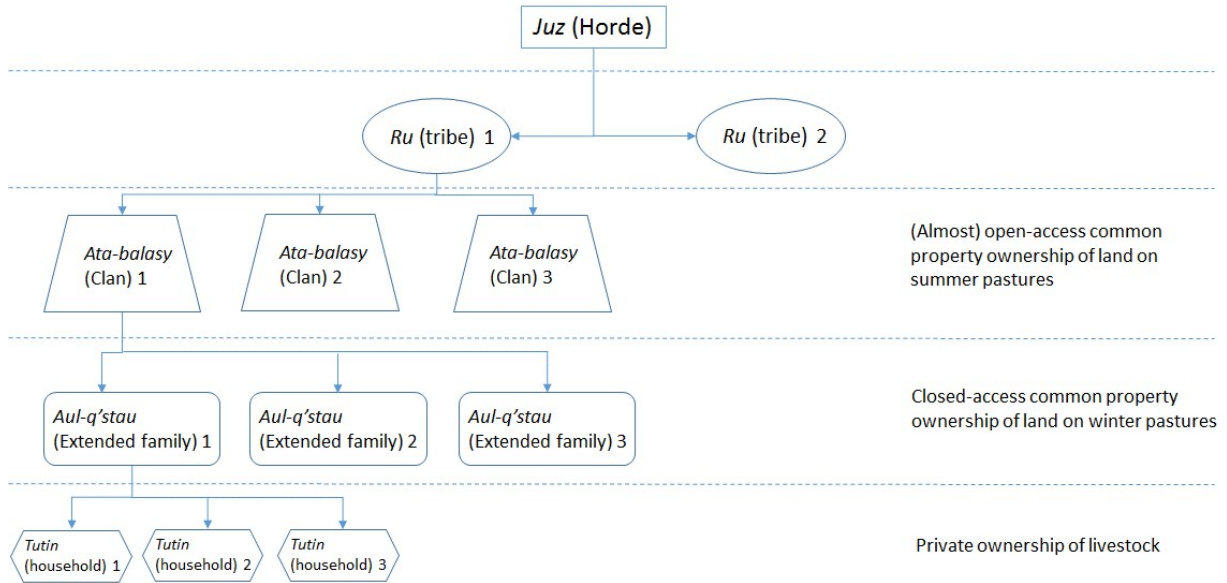


Figure 2: Social structure and pre-colonial property rights in the Kazakh society in the 19th century

Source: Guirkinger and Aldashev (2016), on the basis of Chapter 7 of Tolybekov (1971).

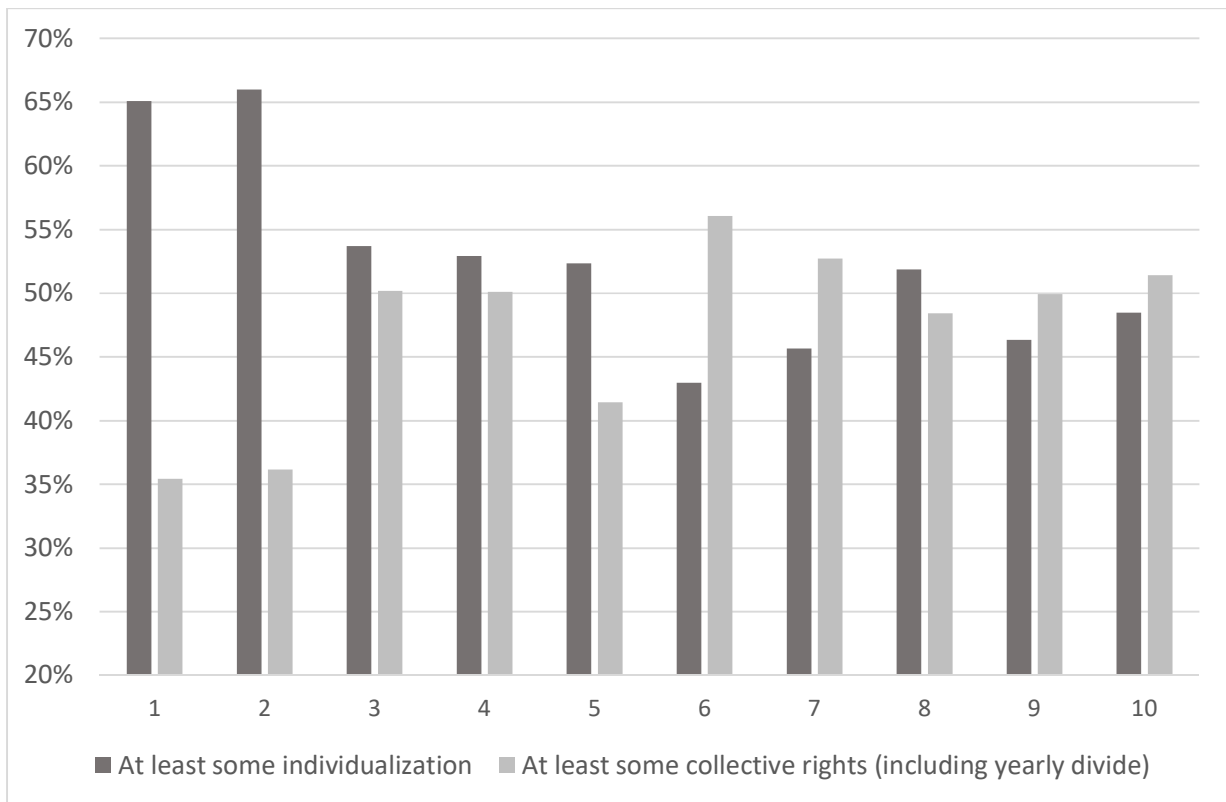


Figure 4: Property rights on haymaking plots within extended families, by decile of distance to the provincial capital

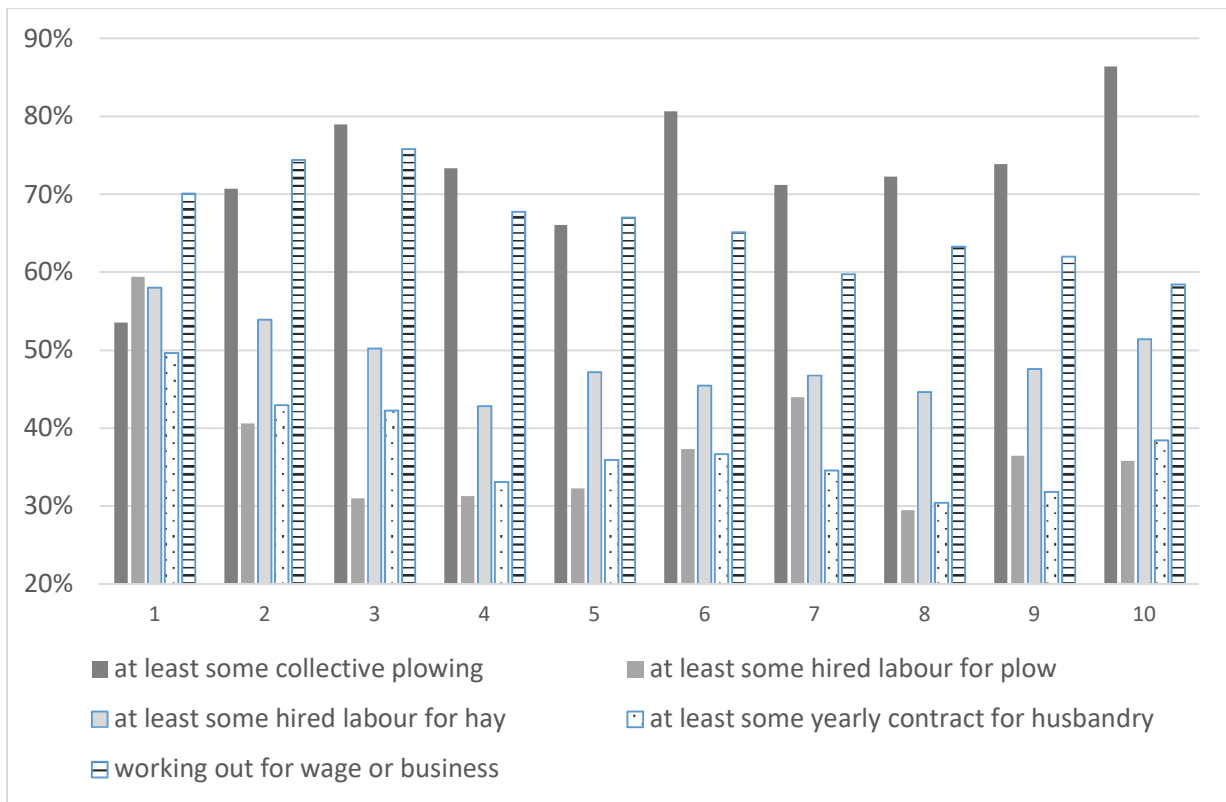


Figure 5: Collective plowing and participation in the labor market, by decile of distance to the provincial capital

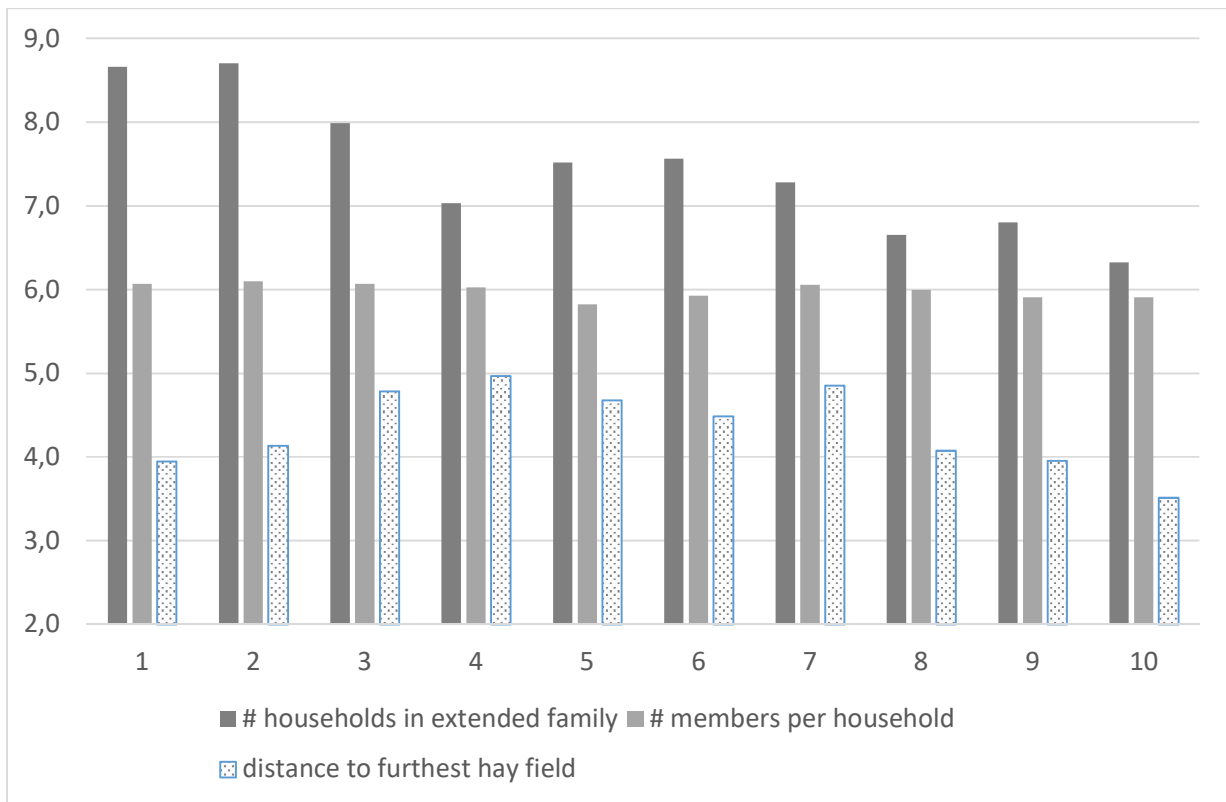


Figure 6: Extended family size and distance to the furthest haymaking plot, by decile of distance to the provincial capital

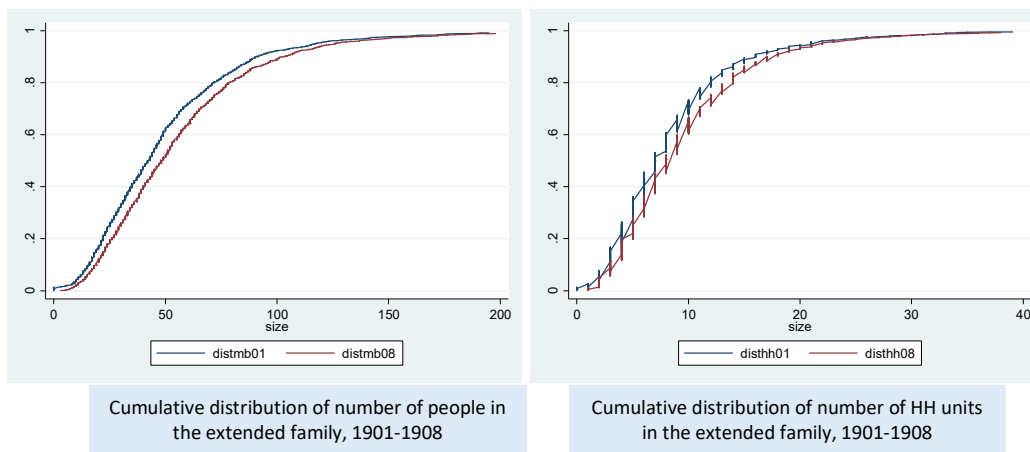
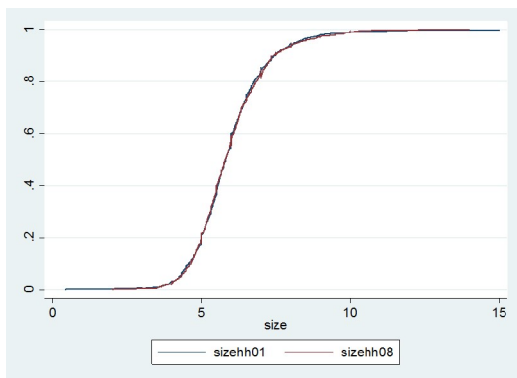


Figure 7: Cumulative distribution of the size of extended families, Petropavl province, 1901-1908



Cumulative distribution of number of people in the household unit, 1901-1908

Figure 8: Cumulative distribution of the size of household units, Petropavl province, 1901-1908

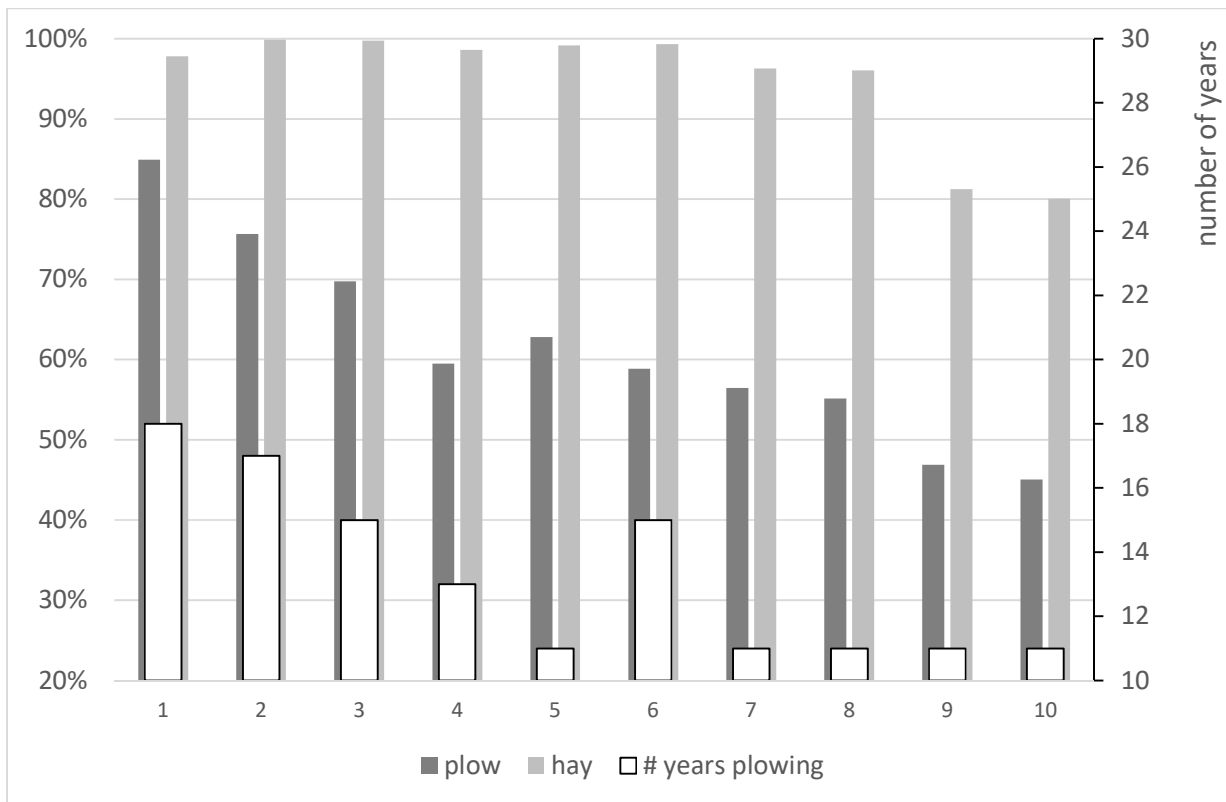


Figure 9: Use of plough, years since started plowing, and haymaking at the extended family level, by decile of distance to the provincial capital

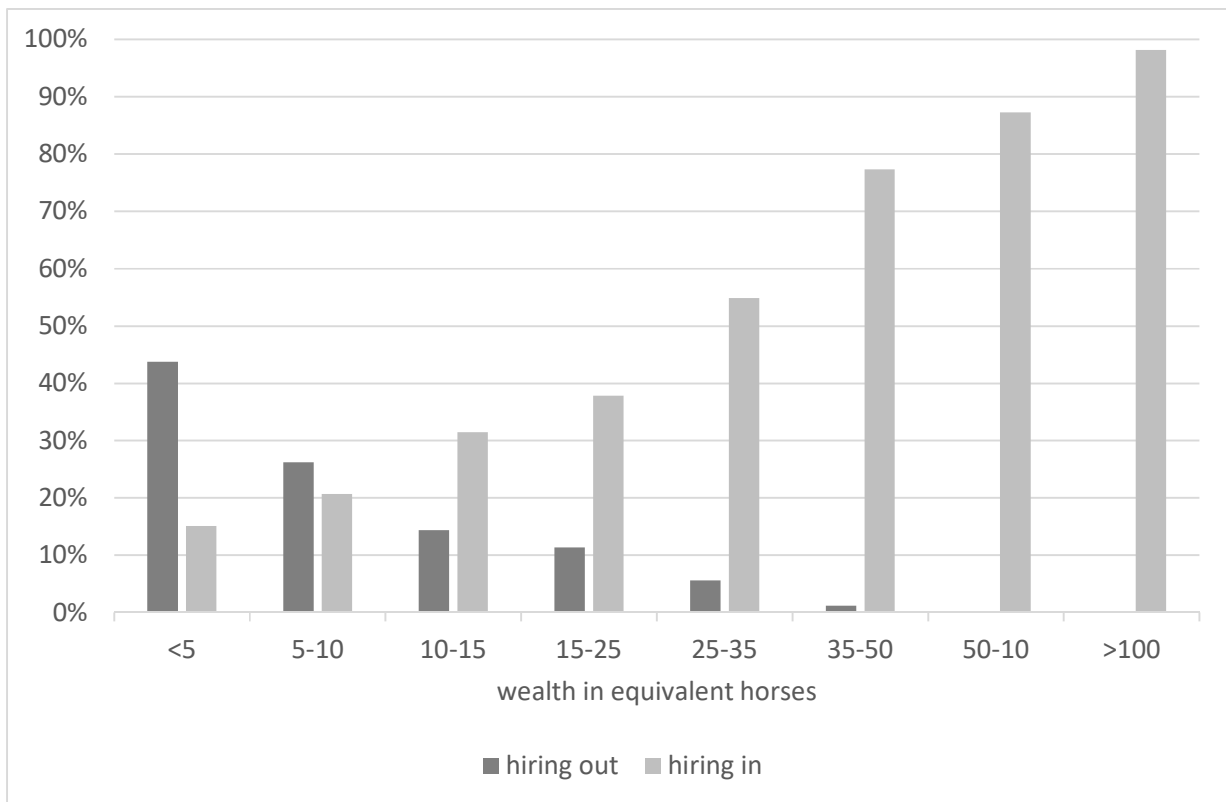


Figure 10: Household labor market participation, by wealth level (in adult horse equivalent), Aktyubinsk and Kustanay provinces, 1908

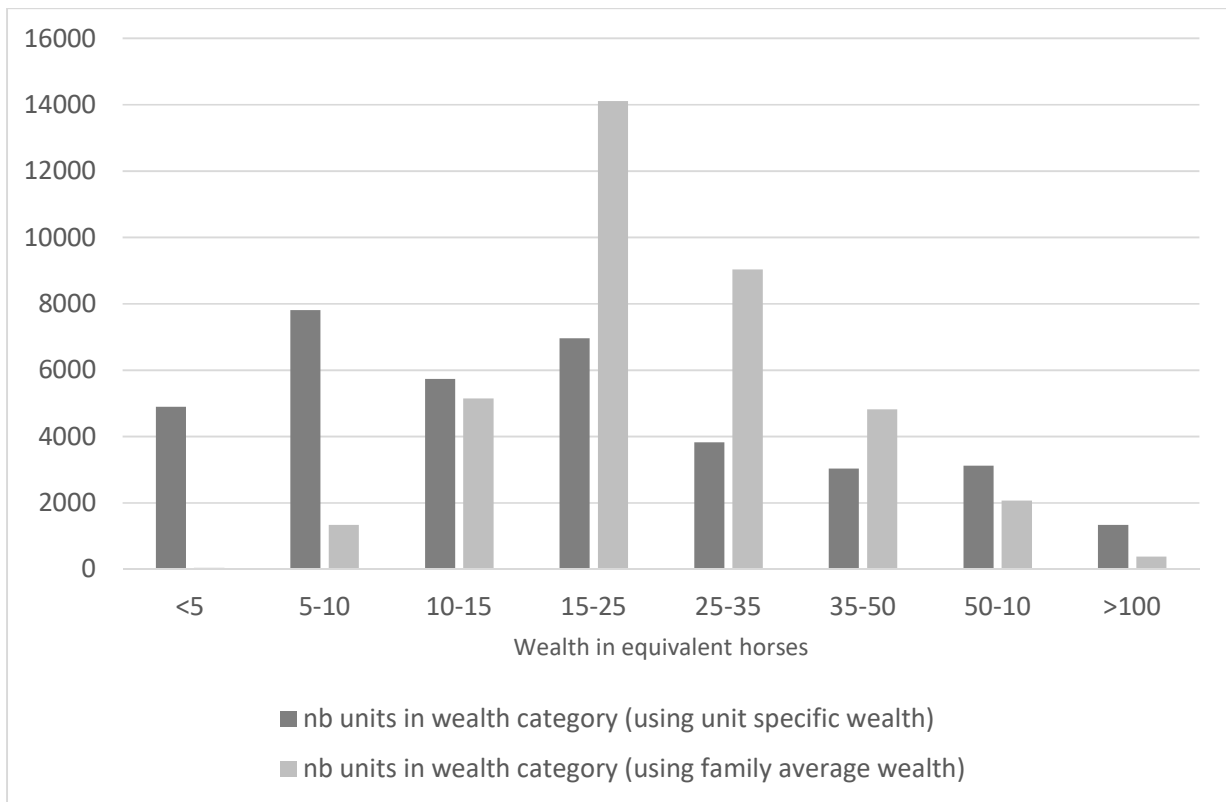


Figure 11: Distribution of household wealth (in adult horse equivalent) and of extended family average wealth