

Land Communes and Factor Market Imperfections: Micro-Evidence from Late 19th-Century Russia

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Abstract

Why was the Russian economy relatively backward before the Revolution? Alexander Gerschenkron and others have argued that the peasant land commune's system of collective property rights and control over household resource decisions introduced frictions into factor markets. These features of the commune reduced the ability of households to exit agriculture, thus lowering the supply of labor to industry and economic growth. I employ newly collected archival data from a survey of rural households in 1899 to evaluate this argument. I show that households used a variety of factor adjustment mechanisms. These included the hiring of labor and the allocation of household labor to off-farm work. Households actively participated in land rental markets and were able to shift land between generations and within the community through the commune's land allocation system. By looking at household mortality shocks, I measure the extent of factor adjustments and the degree to which households were able to respond through the various land and labor mechanisms. I show that household adjustments to mortality shocks came primarily through the labor market. I also find that the communal land allocation system was relatively efficient for adjusting land holdings. Even when it lagged in reallocating shares of the communal land, households could substitute by adjusting through labor and land rental markets. These findings suggest that distortions created by the commune in one market did not prevent households from making needed factor allocations through other means. This implies that communal limitations on labor mobility were less significant than Gerschenkron argued.

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1 Introduction

Before Stalin forced the collectivization and industrialization of the Soviet Union, Russian economic development lagged far behind Western Europe and the U.S.² To Alexander Gerschenkron and other scholars, the inefficient institution of the peasant land commune caused this “economic backwardness”³ The commune created poor incentives for improving agricultural productivity and gave rise to market imperfections that hindered the reallocation of resources to more advantageous uses. In this paper, I draw on newly collected archival data to investigate the latter of these effects.⁴ The “Gerschenkronian argument” states that the peasant commune introduced frictions into both land and labor markets that prevented the exit of households from agriculture, thus limiting the supply of labor to industry.⁵ My research shows that peasant households were able to flexibly adjust their land and labor supplies when confronted with shocks to factor endowments and communal inefficiencies. These adjustments occurred through both market transactions and the commune itself, with a high degree of substitutability between the two. These findings highlight the importance of market and non-market mechanisms for overcoming inefficient institutional practices.

The land commune was formalized by the reforms of the 1860s, which freed the serfs and began the process of transferring collective land rights (and associated financial obligations) to the peasant communes.⁶ Households were assigned membership in communes and received shares in the community’s aggregate land endowment and financial burdens. The commune then allocated and reallocated these shares based on household characteristics. Allotment shares were difficult to transfer, especially to outsiders. The commune retained control over household exit and off-farm work decisions. This institutional framework lasted until the early 1900s. Gerschenkron interpreted the communal allotment system not only as a distorted version of a land market, but he also emphasized that the institution made it costly for

¹Russian proverb cited in Atkinson (1983, p. 6).

²Per capita income in 1913 was approximately \$1500 in 1990 U.S. Dollars, which was less than one-third of the U.S.’s and about half of the figures for France and Germany (Maddison, 2003).

³Gerschenkron (1962 and 1965); and Robinson (1932 [1972]).

⁴In Nafziger (2005), I study the direct impact of the commune on agricultural productivity.

⁵According to Gerschenkron, the communal system meant that, “labour supply to Russian industry was numerically inadequate and inferior as to its quality...Taken in isolation, the *obshchina* [(communal)] restrictions on labour mobility were an obstacle to industrial progress” (1965, p. 767).

⁶The commune was essentially a village with the additional institutional features outlined below. In Russian, the land commune is variously referred to as the *mir*, the *pozemel’naia obshchina*, or the *sel’skoe obshchestvo*, depending on the exact context. Grant (1972) discusses these distinctions.

households to adjust factor holdings through labor market reallocations. The implied low mobility of labor caused Russian industry to be inefficiently capital intensive, which slowed economic growth.

The argument for the institutional roots of factor immobility and Russian backwardness continues to persist in the literature.⁷ Adherents of this view have offered little empirical support beyond citing the presence of the commune and noting the large size of the rural sector.⁸ There have been few attempts to document the workings of Russian land and labor markets or study how households used them under the communal framework. I use new archival data on rural households from late 19th-century Moscow province to address these gaps in the literature and to understand the institutional foundations of Russian backwardness. I find that households actively rented in and out land, saw their communal allotments adjusted to household characteristics, hired agricultural labor, and sent labor off the farm. I provide econometric evidence that households used these mechanisms to respond to short-run mortality shocks and long-run lags in the communal allotment mechanism. My results suggest that the communal system did not prevent households from making needed factor adjustments, which implies that the institution had a less negative effect on factor mobility than Gerschenkron argued. These findings are consistent with a more nuanced view of the effects of agrarian institutions on the economic development of late 19th-century Russia.⁹ This paper also contributes to the growing number of empirical studies on how rural institutions impact factor markets in developing countries.¹⁰

The paper is divided into four sections. The first outlines the historical and theoretical context to Gerschenkron's argument. To clarify the issues, I outline a simple economic framework of rural household behavior under the communal system. The second section introduces the archival data and documents household factor market adjustments. The third section supplies econometric evidence on how these different mechanisms were utilized by households when hit by labor shock or when facing distortions in the communal allotment system. The final section summarizes and discusses the implications of this study for understanding Russian economic development before the Revolution.

⁷Allen (2003) cites it approvingly and argues that only coordinated Soviet policies (backed by coercion) were able to force labor into industry.

⁸In 1905, 87% of the population was rural and 77% of peasant households in European Russia held land as members of communes (Atkinson, 1973, pp. 773-774; citing 1905 land statistics).

⁹See Gregory, 1994; and Kingston-Mann, 1991.

¹⁰For a recent example of such research in the context of China, see Benjamin and Brandt (2002).

2 Gerschenkron's View of the Commune

Gerschenkron asserted that the legislation of the 1860s created a communal structure that limited factor mobility.¹¹ After outlining the institutional history underlying Gerschenkron's argument, I discuss the historical literature on peasant factor market activity in this period. A long tradition of scholarship emphasizes that there actually was a significant amount of mobility between agriculture and industry in this period. The last part of this section offers an economic framework that reconciles Gerschenkron's argument with this historiography and motivates the empirical work to follow.

2.1 The Commune as an Economic Institution, 1861-1900

The reforms of the 1860s gave the village commune a formal place in rural Russian society.¹² This began when the Emancipation Act assigned newly freed serfs legal membership in communes.¹³ Communes were then made the collective recipients of the land settlements (*ustavnye gramoty*) and redemption deals (*vykupnye sdelki*) that transferred land rights to the peasants. Under the complicated rules of the Emancipation Act, the settlements outlined the peasants' previous land rights and seigniorial obligations and translated these into new collective land allotments and a set of temporary financial obligations.¹⁴ Individual households were then bound to the land allocation decisions of the community and jointly responsible for the corresponding obligations.¹⁵ When redemption was initiated, a contract was drawn up where the state financed the purchase of the collective allotment in return for loan repayments over a projected 49-year period. Thus, the commune came to be both the formal holder of land rights and the institution responsible for ensuring that its members fulfilled their obligations.¹⁶

¹¹ "By erecting a barrier to the dissolution of the individual's ties with the commune, the reform tended to preserve, if not reinforce, the traditionalism and the inefficiency of peasant agriculture" (Gerschenkron, 1965, p. 747).

¹² Collective institutions were a long-standing feature of Russian society under serfdom, but the reforms endowed the commune with an official legal status. Dennison (2004) offers a critical survey of the commune under serfdom.

¹³ The majority of Russian peasants in 1861 were under the jurisdiction of the state rather than the nobility. Their reform process paralleled that of the former serfs, and the two were formally brought together in the early 1880s (Zaionchkovskii, 1960, Chp. VII).

¹⁴ The new rights were primarily determined by the norms laid out in the Local Statutes of the Emancipation Act (reprinted in *Prilozheniia*, 1915). State peasants received similar deals after legislation in 1866.

¹⁵ This was written into the settlements by calling on the legal principle of *krugovaia poruka* or collective responsibility.

¹⁶ Although the redemption payments were reduced over time, and the famous soul tax was abolished in 1886, by 1898 there still remained a wide variety of local and government taxes placed on the commune (for example, see *Statisticheskii*, 1900, Part IV, pp. 14-30).

Once the community entered redemption, it was difficult for households to legally separate themselves from the commune.¹⁷ The Emancipation Statutes originally allowed households to alienate their allotment by paying all arrears and giving up claims to any part of communal land (Clause 36). However the Redemption Statutes (Clauses 165 and 173 in particular) required the payment of at least one-half of the full redemption debt on an allotment share before a household could separate itself.¹⁸ This mechanism resulted in few exits from the commune.¹⁹ Moreover, households could not legally sell their allotments, and communal land sales were subject to local government approval. Transfers of land within the commune officially required the approval of the village assembly (Robinson, 1932 [1972], pp. 75 and 113).²⁰ Legislation in 1893 strengthened these potential imperfections further by forbidding sales to non-peasants and by increasing assembly control over departures, even when the household was able to pay off the redemption loan (two-thirds of voting members now had to approve).²¹ While households were always obligated for their portion of communal payments, their current land allotment was potentially subject to redistribution to another household.²² This may have limited the formulation of long-term rental agreements and land transfers in general (Robinson, 1932 [1972], pp. 121-124; and Gerschenkron, 1965, p. 755). The legislation of 1893 also mandated at least 12 years between communal repartitions. This potentially made it even more difficult for households to optimally allocate factors.²³

Further legislation during the post-Emancipation period strengthened the potential control of the commune over household labor decisions. An act of 1886 placed household divisions (and the resulting separation of land allotments and burdens) under the final jurisdiction of the commune. In order to ensure that the fiscal obligations were fulfilled, beginning in the 1860s, communal authorities were given legal authority over the issuance of passports.²⁴

¹⁷Redemption was mandatory after 1881.

¹⁸*Prilozheniia*, 1915. If the commune refused the other half, the household was responsible for all the outstanding debt.

¹⁹Even in 1905, almost 100% of peasants in Moscow province held land under communal as opposed to household tenure (Zyrianov, 1992, p. 36). Around the turn of the century, net income from a desiatina (2.74 acres) of land in the province ranged from 3.3 to 7.3 rubles while the average redemption payment was approximately 1.22 rubles (derived from *Moskovskaia*, vol. 2, pp. 93-95 and vol. 1, part 3, p. 479; *Statisticheskii*, 1900, Part IV, pp. 14-30; and *Statistika*, 1906, Table 1). Hoch (2004) has recently argued that redemption payments in the Central Industrial Region were not prohibitively high.

²⁰Communes were generally governed by an assembly of all household heads, presided over by the elder (*starosta*), and often required unanimous agreements.

²¹Gerschenkron (1965, pp. 771-775).

²²Nafziger (2005) discusses communal land re-allotments in more detail.

²³Crisp (1978, p. 324) argues that even though communal repartitions may have aimed at matching land with household resources, the mechanism was not automatic and often lagged. This is discussed in greater detail in Section 4.

²⁴When a peasant wished to migrate farther than 30 kilometers from his or her assigned village for any

Thus, until reforms after 1900, the peasant land commune was given legal authority over how households made decisions regarding both land and labor resources.²⁵

2.2 The Microeconomics of Gerschenkron

In a world with perfect factor and product markets, peasant households allocate their land and labor endowments according to market prices that equal the internal shadow values.²⁶ When factor market imperfections are present, a wedge is created between buying and selling prices. Household allocations are then determined by the shadow values, which may diverge substantially from either market price. These factor shadow prices (and the resulting allocations) are then a function of household assets and endowments, as the well-known separability property fails (Bardhan and Udry, 1999, Chp. 2). When these wedges exist in multiple markets, distortions in one market will then become more difficult to adjust to through another one. Shadow values exceeding factor purchase prices cause households to rent or buy factor services, while shadow values below market sales prices drive households to sell or lease factors on the market. When the shadow value lies within the market price band, households remain self-sufficient and may exhibit low factor demand and supply price elasticities.²⁷

This framework is useful for understanding the microeconomics of Gerschenkron's argument. The features of the communal allotment system and the institution's control of household decision-making may have driven a wedge between factor purchase and sale prices. This would have caused household shadow values to diverge from the market prices for factor services. With distortions in both land and labor markets, responses to shifts in shadow values in one market would have been difficult to adjust to through the other.²⁸ This would have led to a reduction in market transactions (i.e. low factor mobility) as households found it costly to enter factor markets relative to remaining self-sufficient. I interpret a strict version

period, he or she was required to get a passport from local government or communal officials. Renewals of passports were then contingent on the migrants continuing to fulfill his or her portion of communal obligations. Even though the Passport Act of 1894 put renewals under the control of the household head, the communal still retained a say in the allocation and rescinding of migration documents (Burds, 1998; Gerschenkron, 1965, pp. 753-754).

²⁵The state ended joint responsibility in 1903, and redemption payments were done away with in 1905. The Stolypin reforms of the 1900s created administrative and financial mechanisms for households to withdraw their allotments and establish independent family farms (Pallot, 1999; and Zyrianov, 1992).

²⁶Here I abstract away from capital.

²⁷See De Janvry et al. (1991), Sadoulet et al. (1998), and Bedi and Tunali (2004).

²⁸This can be rephrased in terms of Besley's (1995) model, where poorly defined, communal property rights make it more difficult for households to undertake land transactions to equalize the marginal products of this and other factors.

of Gerschenkron's argument as when imperfections were so great that factor market activity ceased, and all changes in factor adjustments took place through the commune. If factor market activities were evident (as the next section asserts for late 19th-century Russia), the frictions of the commune were not so large as to prevent households from using markets to respond to changes in their shadow values.

This interpretation of Gerschenkron leads to a set of empirical questions. First, how were Russian peasant households making factor market adjustments under the communal system? Second, to what degree did these mechanisms work to allow households to respond to changes in their shadow values of factor services. Third, did the communal allotment system work as a substitute or complement to factor markets? Finally, did labor and land market activities allow peasants to adjust to specific frictions created by the commune. I address these questions in the next two sections.

3 Factor Adjustments in the Moscow Countryside, 1861-1900

Gerschenkron's ideas about the commune run counter to a long-standing historiography, which emphasizes the mobility of labor in the region around Moscow known as the Central Industrial Region (CIR). The development of the railroad and strengthened contacts with international markets encouraged regional specialization in Russia over the last half of the 19th century (Metzger, 1974). The relatively poor agricultural conditions of the CIR increasingly forced peasants to look for non-farm sources of income for subsistence and to fulfill the cash requirements of their communal obligations.²⁹ These developments built upon a tradition of rural and factory industry that emerged during serfdom (Bradley, 1985, Part 1; and Johnson, 1979, Chps. 1-2). The historiography of this period notes that non-agricultural production in the CIR occurred with a labor force that maintained close ties to the village (Tugan-Baranovsky, 1907 [1970]; Von Laue, 1961; and Burds, 1998). Many households produced handicrafts or textiles in the home during the winter months. Factory and non-agricultural work was either seasonal or drew only a portion of the household's labor off the farm. Remittances supported households back in the village and paid for communal obligations. To scholars working in this tradition, this was indicative of closely integrated labor markets where peasant households could adjust their labor allocations, regardless of

²⁹These off-farm occupations included passport-supported seasonal and yearly movement to factories, as well as a large amount of secondary employment in transport and trading, traditional artisan (*kustarnaia*) work, and protoindustrial production in the home.

the communal frictions in the land market.³⁰

To Gerschenkron, these connections between farm and non-farm employment reflected how the communal system forced peasants to retain linkages with the village. Households in the CIR were unable to release their land so they inefficiently held household labor on the farm, while the commune controlled labor decisions out of concern over the fulfillment of financial obligations. In his framework, neither land rental markets nor labor markets worked to ease these distortions in order to release labor. If the labor was relatively immobile between industry and agriculture, one would expect to find persistent real wage differences between agriculture and non-agricultural sectors. Borodkin and Leonard (2005) study the time series properties of rural and urban wages around St. Petersburg over the period 1885 and 1910.³¹ They show that wages in the two sectors moved together, which is consistent with integrated markets. However, they also find a persistent wage-gap that could be indicative of distortions created by the commune. Their work only indirectly addresses how peasants actually made labor (and land) allocations when the commune possibly distorted factor markets. I turn to a newly collected, household-level dataset to investigate the extent of factor adjustments by rural households in the CIR and how these resource decisions were influenced by the commune.

3.1 The Household Data

I collected data from the archival holdings of the statistical office of the Moscow provincial zemstvo.³² The zemstvo (plural – zemstva) was a quasi-state institution founded in the 1860s in 34 provinces of European Russia to monitor and carry out policy in rural areas. Along with responsibilities like rural public health and education, zemstva were required to monitor the taxable resources under their jurisdiction (Johnson, 1982). It was in fulfillment of this last function that the Moscow zemstvo carried out a survey of all rural households of the province in 1898-1900. For the economic historian, this survey is especially useful because it was undertaken in a unified way across the entire province, it was one of the first to ask questions at the household rather than village level, and because a portion of the original household returns are retained in the archives.³³ Moreover, the coverage of this

³⁰Crisp (1978) explicitly takes issue with Gerschenkron by arguing that labor markets were relatively integrated.

³¹They argue that these data are representative of the entire CIR.

³²The records of the zemstvo can be found in fond 184 of the Central Historical Archive of Moscow.

³³Earlier zemstvo surveys, such as the one analyzed in Nafziger (2005), asked questions of village officials or the communal assembly as a whole. After 1900, zemstvo and Soviet researchers shifted towards more detailed budget studies of samples of households (i.e. Chaianov, 1986). The hundreds of budget studies and zemstvo surveys remain almost entirely unexplored by Western economic historians.

survey permits the study of household resource decisions under in the communal context.³⁴

Only 38 out of the over 5000 villages of household returns were preserved in the archive.³⁵ These represent a subset of all villages in two townships: Morozovskaia in Dmitrov district and Pavlovskaia in Zvenigorod district. Out of these 38 villages, 19 sets of responses were collected by hand.³⁶ This resulted in data from 647 households and over 4000 individuals. The survey provided information on demographics, non-agricultural employment, livestock and housing, land holdings, yields, and farming practices. In addition to these data, further information on each village was collected from tables published in *Moskovskaia*.³⁷

3.2 Micro-Evidence on Household Factor Adjustments

Table 1 documents the villages of the sample and indicates a significant amount of factor market activity. A subset of all households possessed land allotments.³⁸ Households could reside in the village without holding an allotment.³⁹ There was a relatively large number of “absent” households (over 20% of those assigned to the communities).⁴⁰ All this suggests that the households were not forced to hold allotments and that costs of exiting the commune were not prohibitive.⁴¹

Table 1 shows that the portion of individuals who spent at least part of the year in non-agricultural employment varied considerably but was relatively high. This is also evident in Table 2, which summarizes the individual and household data from the sample. This table

³⁴A preliminary survey of zemstvo holdings in Russian provincial archives indicated that those of Moscow were the most completely preserved. This determined the geographic choice.

³⁵According to *Moskovskaia* (vol. 1, pp. VI-X, 1903), data was collected from all land communes (*pozemel'nye obshchiny*) in rural areas. This excluded suburbs, large estates, religious settlements, and other non-peasant communities. Enumerators included local officials, gentry women, and university students (TsIAM: fond 184, opis' 11, delo 27). The remaining responses to the survey are in TsIAM: fond 184, opis' 10, dela 2435-2446 and 2519-2544.

³⁶I choose these 19 randomly but ensured coverage of both former serf and former state peasant villages. There is nothing in the archives to indicate why the returns from these particular villages were preserved. Within each township, the retained villages were in alphabetical order.

³⁷A longer discussion of the data is provided in the Appendix at the end of the paper and in the Technical appendix available from the author.

³⁸The sample captures almost all of these households. The discrepancy in the between the sample and the village totals arises because the village of Il'inskoe jointly possessed allotment land with a small settlement (Alexandrov) not included in the sample.

³⁹The sample includes 75 households without a share of allotment land.

⁴⁰These households might have retained a structure in the village or continue to pay a portion of communal obligations. *Total households* include both those present (which matches my sample, N = 648) as well as those absent (N = 136).

⁴¹According to the original instructions for the survey, households who already redeemed their land were not to be enumerated. (TsIAM f. 184, o. 10, d. 2707, l. 12ob.) Only 2 households in the survey possessed redeemed (i.e. individual tenure) allotment land. The “bias” means that the sample households should be those that the commune has the strongest influence over.

indicates that sample households were large by Western European standards. The average household had over three adult male equivalent workers and six individuals. Seed ratios (a yield measure; not depicted in the table) were quite low – less than 4 for both rye and oats.⁴² Thus, it is not surprising that so many individuals turned to non-agricultural work, especially given the severe seasonality of agriculture in this region. Parts A and B of Table 2 express non-farm work as the percentage of months worked outside of crop production.⁴³ Between 42 and 57% (depending on the measure) of the average household’s time was spent in non-farm work. This time manifested itself in a rich set of non-agricultural occupations (Table 3). Individuals were engaged in a combination of farming, local trade and transportation work, production of simple industrial goods in the home, and migration to factory and service jobs. In no way does this reflect a peasantry tied to the land by membership in communes.⁴⁴ The majority of individuals did work in close proximity to the village, but non-agricultural options were available through out the province. Moscow was a powerful draw to these households, but there were significant sources of employment in other districts as well.⁴⁵

There were substantial gender divisions to these employment patterns. Males were more likely to migrate for work, while females were more likely to be employed on the family allotment (Table 3, Part B).⁴⁶ Household heads, while overwhelmingly male, spent slightly more time in off-farm work than other individuals.⁴⁷ However, households were not exclusively limited to the labor of wives, children, or elderly relatives for farming their allotments. Table 2 and Part C of Table 3 indicate that households had considerable flexibility in how they farmed their allotment land. 28 households either choose not to use their allotment at all or rented the land entirely out. Although Gerschenkron and other scholars echo Chaianov

⁴²Farming took place in a simple 3-field system, with rye grown on the winter field, oats and potatoes on the spring field, and livestock pastured on the fallow area. More information on the yields and crop mix of the sample households is presented in the Technical Appendix available from the author.

⁴³See the Appendix for how this was defined. For a small number of individuals (46) assigned to a sample household but living off the land, this measure reflects the number of months engaged in a pursuit other than housework.

⁴⁴Burds (1998) notes that communal authorities had the right to force households in arrears to hire labor out. He notes that this practice was rare, but often village officials okayed employment contracts only after assuring payment on a household’s financial obligations. Evidence from the Moscow region suggests that the commune occasionally acted as a collective bargaining agent in contracts with outside employers (ibid., pp. 108-113).

⁴⁵Moscow was especially important for households from Pavlovskaaia township. 234 of the 1546 individuals from Pavlovskaaia stated that they worked in Moscow. In Morozovskaia, the corresponding total was 101 out of 1501. These totals do not include some traders with Moscow in their circuit.

⁴⁶This corresponds to the findings of Engel (1986) and Economakis (1998) on gender differences in migration.

⁴⁷Household heads spent approximately 6.8 months off-farm, while the rest of the population older than 15 spent roughly 6.2 months. The household head (*khoziain* or *khoziaika*) was denoted on the response cards.

(1985) by assuming that no agricultural labor markets existed for peasant households, households could hire in labor to work their plots.⁴⁸ This could take the form of full-time summer hires (49 households or 7.6% of the sample) or hiring for specific tasks, such as plowing, harvesting, or threshing (86 or 13.1%). These findings suggest that households could take advantage of markets to sell excess labor supply as well as hire in when needed.

The relatively large household size translated into an average land-labor ratio of 2.91 acres of communal arable allotment land per adult male equivalent (Table 2). The fallow of these allotments, along with pasture, forest, and hay land, supported about 1 horse and slightly more cattle.⁴⁹ But there is considerable evidence that households were not limited to the communal land allocation for their agricultural production decisions. Specifically, numerous authors have pointed out the presence of land rental markets in rural Russia after 1861. Anfimov (1961) argues that the insufficiency of land granted under the original settlements forced households to rent in a considerable amount of land.⁵⁰ Moreover, peasant households in the CIR were able to rent out their shares of allotment land.⁵¹ Evidence from the household survey suggests that the selling and buying of allotments (or other land) was rare.⁵² However, land rental markets appear to have eased distortions of the communal land allocation system by aiding in the acquisition of land when communal allotment shares were inadequate or in leasing land out when labor was abundant.

The sample households made significant use of land rental markets. This is highlighted in Tables 2 and 4.⁵³ 10% of households rented out a portion of their allotment land, while 41% of households rented in some type of land (Table 2). Arable and pasture lands were both rented in. Part A of Table 4 indicates that these transactions occurred primarily with the commune, communal officials, or peasants in the village.⁵⁴ This suggests that that the

⁴⁸Burds (1998), Engel (1986), and Economakis, (1998) all emphasize that plots were worked by household members (especially wives) left behind in the village. Dennison (2004) documents the presence of live-in agricultural servants in her case study of a large serf estate in the CIR.

⁴⁹Livestock were the main type of agricultural capital in the CIR, for they provided motive power and manure. 55% of the households possessed a plow. 237 households mention spending an average of 34 rubles on feed and roofing thatch with only a few (3) mentioning purchases of fertilizer. See the discussion below on extensions to the analysis.

⁵⁰Anfimov. Zaionchkovskii (1960) and Hoch (2004) also discuss the extent of .

⁵¹Selina (1987) outlines the contractual features of rental deals involving allotment land in Moscow district.

⁵²Only 4 households acknowledge purchasing land and none mention selling allotments.

⁵³Missing observations were especially prevalent in the land rental data. Households did not provide consistent answers for the amount of land rented, the type of land, or the payments made or received. Thus, I focus on the dichotomous decision of whether households rented out or rented in land. Several households rented in or out more than one plot. See the Technical Appendix for more detail.

⁵⁴The large number of rentals from local landlords and merchants is more indicative of the inadequate land deals received in the 1860s. Zaionchkovskii (1960) and Moon (1999) describe how land rentals helped reconstitute the landlord-peasant relationships of serfdom.

commune did little to limit transactions of allotment land. Indeed, the commune apparently acted as a clearing house for allotment rentals (and the land of absent households) outside of the allotment mechanism as normally conceived.⁵⁵ Thus, markets for land and labor gave peasant households mechanisms to adjust their factor endowments outside of the communal allotment system.

4 Responding to Factor Distortions in the Communal Setting

The last section documented the factor market activities of the households in the rural Moscow sample. This section studies the how households adjusted their resource holdings when shadow values of factor services changed and factor markets were potentially distorted by features of the commune. Works such as Borodkin and Leonard's (2005) study of labor market integration focus on variation in wages as evidence for how well markets are working to equalize the marginal products of labor. Studies of market imperfections in modern developing countries tend to focus on single markets (labor as in Sadoulet et al., 1998; or land rentals in Deininger and Jin, 2005) or specific consequences such as land tenancy (e.g. Skoufias, 1995) or farm size (e.g. Benjamin and Brandt, 2002). Most of these studies are agnostic about the source of imperfections and often do not acknowledge that adjustments to imperfections may occur through multiple mechanisms simultaneously.⁵⁶ Recent work by Bedi and Tunali (2004) explicitly allows for the joint decisions of resource allocations by Turkish farmers when facing potential market imperfections.⁵⁷ However, they do not study a particular institutional source of imperfections. I focus on a large set of possible adjustments that households made under potential distortions created by the commune.

Since *all* of the households in the data set were members of land communes, identifying the impact of the institution on household factor allocations (and factor mobility more

⁵⁵For the subset of households that provided information on rental payments, cash was the dominant form of rent (Part B of Table 4). Consideration of the limited information on the amounts paid for renting land indicates that they often corresponded to the level of obligations. This is consistent with households transacting land through the commune or local market for amounts equal to the marginal costs of holding that land.

⁵⁶Swamy (1998) explores the implications of imperfections on resource allocations in colonial Punjab. Dealing with data issues similar to this of this paper, he does investigate households allocations through several markets.

⁵⁷These authors use data on dichotomous allocation decisions similar to the measures employed in this paper. They base their reduced-form approach (with restrictions across the equations for land and labor decisions) on a structural model of household allocation decisions when imperfections cause some households to remain self-sufficient rather than transact through the market.

generally) is difficult. However, two unique features of the data make an indirect approach possible. I first study how households responded to a shock to the shadow value of labor implied by the recent death of a household member. If households were able to adjust their land-labor ratios by engaging in market transactions in the wake of the shock, I interpret this as evidence inconsistent with a strict form of the Gerschenkron argument.⁵⁸ I then study whether households could make use of market mechanisms when the commune lagged in adjusting land allotments to match household demographics. This uses information on the years households possessed their current allotment. This section ends by addressing several extensions and the robustness of the results.

4.1 Household Responses to Mortality Shocks

The survey enumeration methodology provides information on recently deceased members of the household. Demographic information in the household responses was completed using the 1897 Russian National Census lists and then checked when enumerators visited each village. Thus, I know if a household member died or left for some other reason in the previous two years.⁵⁹ The incidence of this mortality “shock” to household labor is summarized in Table 5. 13.6% of households (88 of 647) were affected by a mortality shock in the previous two years.⁶⁰ Households that experienced mortality were larger due to a greater number of more marginal labor suppliers (e.g. children or elderly). On average, this shock resulted in a loss of 0.765 adult male laborers.

The null hypothesis that adjustments were only possible through the allotment mechanism implies two testable restrictions. First, households hit by mortality shocks should be no more likely to utilize land or labor markets to adjust their land-labor ratios than unaffected households. Second, land-labor ratios themselves should not be correlated with the use of these markets.⁶¹ Households could adjust by renting (more) land out, renting (less) land in, hiring (more) labor in, or sending (less) labor off the farm.⁶² The exogeneity of the shock

⁵⁸A strict form of the Gerschenkron argument would posit that households faced such significant imperfections in factor markets that all adjustments had to occur through changes in the communal allotment itself.

⁵⁹The marriage of daughters and sisters was the other significant reason people left the household. I focus on mortality here and discuss demographic adjustments below.

⁶⁰My measure of mortality-induced labor shocks weights each death by its potential effects on household labor resources (See the Appendix).

⁶¹Gerschenkron’s argument implies that the commune adjusted allotment land to match household labor resources. This negated the need to rent land or hire labor (in or out). Thus a relatively high amount of allotment land relative to labor should not lead to households using markets to lower the ratio.

⁶²The incomplete information on quantities and wages of labor hires also necessitated a dichotomous coding of these variables (1 if the household hired someone, 0 if it did not). Numerous assumptions and

is not essential in this setting, for under the strict version Gerschenkron’s argument, households would not employ market mechanisms to adjust to such a shift in the shadow value of labor. As long as the empirical work controls for the different ways households could adjust factor holdings, it does not matter if households changed behavior before or after mortality occurred. I do not observe all the ways households could adjust; therefore, my findings will be underestimates of the true amount of flexibility.⁶³

In Tables 6 and 7, I present results on household adjustments to mortality shocks through four different mechanisms: renting land out or in, hiring labor in, or allocating labor off the farm. Since local market conditions and other unobservables varied substantially across villages and could impact the set of adjustments available to households in numerous ways, I model these decisions unconditionally and by conditioning on village fixed effects.⁶⁴ The form of the dependent variable dictated whether the models were estimated linearly or as logits.⁶⁵ The coefficients represent probabilities of engaging in the particular behavior for the dichotomous variables and a portion of the year for non-farm work decisions. Every regression controls for characteristics of the household head and for wealth as proxied by square feet of housing.⁶⁶ Since households with larger or smaller factor ratios may respond differently to the same size shock to household labor, I interacted the shock measure with the land-labor ratio. It is worth repeating that the measure of the land-labor ratio is an ex-ante measure that only includes communal allotment land and household labor.

Table 6 documents the decision to rent land out or in.⁶⁷ Except for gender, characteristics of the household head proved to be relatively unimportant. Women were less likely to participate in rental markets, especially for renting in land. The significance of housing area as a proxy for wealth is persistent through out the regressions.⁶⁸ Wealthier households were

corrections were required to construct the continuous measure of non-farm labor market participation. Thus, the indicators of whether households could adjust along these margins will be measured with error.

⁶³Mortality in late 19th-century Russia was quite high and the lack of good public health makes exogeneity a plausible assumption. Table 5 shows that these deaths were distributed across the age distribution. Kurkin (1899 and 1902) discusses the causes and age-distribution of mortality in Moscow province in the late 19th century.

⁶⁴Standard errors are robust to village-level clustering in all specifications. The tables report goodness-of-fit and test statistics for the explanatory power of each model.

⁶⁵All logit specifications report marginal effects evaluated at the full sample means (or for 0 to 1 of discrete). The conditional logit regressions are estimated over villages that had variation in the dependent variable. Fixed-effects OLS regressions are offered for comparison.

⁶⁶Numerous variations on these specifications were run with controls for the characteristics of other household members and other wealth proxies such as the type of roof and whether the household held zemstvo property insurance. There were no qualitative differences in the results. The Technical Appendix provides further discussion.

⁶⁷11 of the households that rented out land also rented in (5 arable and 6 pasture). Excluding these households did not significantly change the results.

⁶⁸The significance of the sex of the household head and this wealth proxy implies that consumption and

less likely to rent out and more likely to rent in land. Since household endowments and human capital are controlled for, this result implies that households with more wealth were those specializing in agriculture.

In the models of renting land out, households with more land relative to their labor resources were more likely to rent out land (under the preferred fixed-effect specifications) but this relationship was not precisely estimated. The expected sign of this relationship (negative) did not hold for renting in land. The second part of Table 6 divides renting in land into two categories: arable land and pasturage.⁶⁹ The coefficient on the land-labor ratio in the fixed-effects versions of the pasture models was strongly positive. This is indicative of the complementarity between arable and pasturage, since supporting the necessary livestock required pasture and hay lands.⁷⁰ In all models of Table 6, the measure of mortality shocks turned out to be insignificant. This implies that households did not respond to labor shocks through the land rental market.⁷¹

Table 7 shows that household responses to mortality shocks came through the labor market. The top portion of the table documents the decision to hire in outside labor.⁷² The wealth proxy and literacy were the only variables even weakly correlated with the decision to hire full-time summer agricultural employees. This suggests that managerial skills and specialization in agriculture were linked with full-time farm employees. The importance of flexible labor market adjustments is evident when task workers are added to the analysis.

Households holding a relatively large land allotment were more likely to adjust by hiring workers for specific tasks. Even more suggestive is the strong reaction to a mortality shock. The loss of an adult male worker was matched by a 11-17% greater likelihood that the household hired task (or summer) workers. It is puzzling that this effect is muted for households with relatively more land (the interaction term). However, considering the sample means and estimated coefficients of the land-labor ratio, the shock measure, and the interaction of the two, it is likely that the interaction term is off-setting the level effect of the land-labor production decisions of households were not separable. This is consistent with some amount of market failure.

⁶⁹Pasturage included hay land and forested areas for grazing livestock. Assumptions were made about the type of land transacted when the given information was unclear. See the Technical Appendix.

⁷⁰Numerous scholars have noted that the land settlements often stripped away informal peasant access rights to pasture and other non-arable types of land (e.g. Moon, 1999).

⁷¹The signs on the estimated coefficients are generally consistent with households responding to the labor shock by renting out land or deciding not to rent in land. The interaction terms support this pattern for renting out land but not for renting in.

⁷²Table 2 summarizes a third measure of hiring labor that includes lodgers and resident employees. Including these in the analysis had no effect on the results.

ratio.⁷³ The size of the mortality shock effect greatly exceeds the combined effects of relatively high land-labor and the interaction term. Thus, households were tapping the informal labor market for specific tasks in response to the mortality shock.⁷⁴

The lower part of Table 7 indicates that households hit by a mortality shock held relatively more labor (as measured by months out of the year) on the farm. Female-headed households were engaged in slightly more non-agricultural work.⁷⁵ Households headed by literate individuals were found to (weakly) allocate less labor off the farm, although the effect was small in real terms.⁷⁶ Wealth mattered little for the off-farm decision, which likely reflected the general availability of non-agricultural opportunities in the home, locally, or by migration.

Table 7 also shows that households with relatively more land allocated less labor off the farm. This effect is small – an additional acre of arable land per worker corresponded to the household working 3% (approximately 12 days) less of the year off the land – but it was important with the short agricultural season in Russia. This strategy of labor allocation to deal with excessive land allotments was matched by flexible responses to mortality shocks. The first two specifications in the lower part of Table 7 show that households reacted to the death of a household member by retaining more labor on the farm.⁷⁷ This finding becomes insignificant when the months worked are weighted by their underlying labor value (see the Appendix). Thus, the second two specifications in the bottom panel of Table 7 suggest that it was the more marginal contributors to the household labor supply – such as women, the elderly, and youths – who worked more on the farm in response to a mortality shock.

4.2 Adjustments To Mortality Within the Commune

In Tables 6 and 7, the commune is only present indirectly. Land rentals were often made to and from the commune, but these were only weakly related to the size of allotment or

⁷³The mean mortality shock for those households affected was 0.765 (Table 5), while the mean land-labor ratio for this group was 3.19. The size and signs of the coefficients for land-labor and the interaction term are approximately equal and opposite when the size of the shock is taken into account.

⁷⁴Limited qualitative information from the survey suggests that these task hires were relatives or other members of the village. Payments were often in cash, but in some cases land, grain, or agricultural inputs changed hands.

⁷⁵5-10% more of the year was spent working off the land. Especially important for females was employment in tailoring and the production of textiles within the household.

⁷⁶The effect of age in the second two regressions is likely spurious due to multi-collinearity with the weighted version of household labor. The results do not change when age is dropped.

⁷⁷The loss of one adult male worker corresponded to the household allocating 13% less time to non-farm pursuits.

the incidence of mortality.⁷⁸ Labor activity may have been coordinated or induced by the commune, but I do not observe this in the data. I find that the sample households, all residing in communal villages, dealt with relatively large allotments and mortality shocks by adjusting along the labor margin. But was the land allotment system itself responsive to the needs of households, especially in the case of mortality shocks? Of the 88 households affected by mortality shocks, 11 reported that their land allotment was adjusted in the previous 2 years. Of these 11, only 2 households explicitly note that their new allotment was granted after the death of a member.

Part A of Table 8 lists the reasons households gave for why they received their present allotment. 174 households provided answers to this question, with 102 replying that they received their allotment when a previously extended household divided.⁷⁹ Other demographic changes within the household (deaths, young members reaching adulthood, marriages, etc.) were also significant reasons for new allotments.⁸⁰ Part B of Table 8 notes that the mean length of time with the current allotment was between 8 and 12 years. This Table provides evidence that the communal allotment system was responsive to household characteristics, but allotments often remained fixed for a considerable period.

The communal allotment system approximated a land market. We already saw that the commune played an important role in circulating land through the rental market. Table 9 provides regression evidence that the households was allotted a share of land from the commune that was strongly correlated with their demographic, asset, and employment characteristics. The literacy and age of the household head were unrelated to allotment size, but female-headed households received much smaller allotments (about 30% smaller at the mean). Square feet of housing was positively correlated with allotment size, as was the number of livestock. These findings do not imply causality. Large allotments allowed for more livestock, and the commune likely favored households with a greater ability to contribute towards the collective financial obligations.⁸¹ Indeed, households who were specializing in non-farm occupations received significantly less land, for they could fulfill communal obligations via non-agricultural means. Large allotments may have even encouraged larger family sizes (Gerschenkron, 1965, p. 755). Allotment size was highly correlated with household size

⁷⁸A number of the villages (10 of 19) rented land collectively. For those that did, these shares were a significant source of pasture and hay to support livestock. Village-level information in *Moskovskaia* suggests that all communal rentals were for this purpose. Household pasture rentals were complements, not substitutes, for these communal rentals.

⁷⁹The timing and motivations for these household *razdely* (divisions) are discussed in Worobec (1995).

⁸⁰The community-wide redistributions studied in Nafziger (2005) occurred but were less important than household-specific events.

⁸¹Moreover, livestock required land for pasturing and hay and were necessary inputs into grain cultivation.

and household labor. Households with one more adult male worker received approximately 2 more acres of allotment.⁸² The last specification of Table 9 breaks out the demographic composition of the household. The point estimates suggest that having more working age individuals, especially males, was highly correlated with a larger allotment.⁸³ Observable characteristics of the household do not explain all the variation in allotment sizes (65-75%), but the findings of Table 9 suggest that the commune acted, in part, as an institutional substitute for a land market.

Table 10 returns to the analysis of household responses to mortality shocks. Information on the allotment history of households is too sparse to be able to treat communal allotment adjustments as an outcome variable like land renting or labor market activities. Instead, Table 10 repeats the specifications of Tables 6 and 7 but controls for potential communal adjustments to land allotments since 1897.⁸⁴ A large number ($n = 141$) of households did not report a year for how long they possessed their current allotment, but rather, they answered “for a long time.” These households were unlikely to have received their current allotment since 1897, but a dummy variable denoting them was included in the analysis.⁸⁵ This variable proved to be uncorrelated with any of the measures of factor adjustment.

Of particular interest is the interaction of the dummy for allotment since 1897 and the measure of the mortality shock. If the communal allotment system was able to adjust automatically to such shocks, then the coefficient on this variable should offset the effect of the shock itself. I find very weak evidence of this. The main results from Tables 6 and 7 are robust to including controls for communal allotment adjustments. For the hiring of summer workers, the communal allotment mechanism has the opposite sign to the shock measure, but is imprecisely estimated. The same holds true for the unweighted measure of off-farm work. The only difference emerges when considering renting land out. Here, households that received their allotment in the last two years were less likely to be observed renting land out. This point estimate (about 5%) off-sets the (imprecisely) estimated coefficient on the mortality shock. This finding is also consistent with the communal land allotment system substituting for the land rentals, especially since the commune itself played such a large role in the latter.

⁸²This contribution came on top of the village mean allotment that I control for with fixed effects.

⁸³Having more female youths was uncorrelated with allotment size, since these individuals were likely to soon leave the household through marriage.

⁸⁴Only linear, fixed-effect models are reported. The results for the conditional logits are qualitatively the same.

⁸⁵The results are identical without this control. Characteristics of these households differed only slightly from those that answered with a number.

I conclude that in the short-run, households responded to the mortality shock by adjusting along the labor margin. However, the land margin – both rentals (of allotments and non-communal land) and the communal allotment system – was considerably more active than Gerschenkron and others have assumed. These results are consistent with the commune having rather limited effects on factor mobility. The next section explores this further by investigating whether households were able to transact through markets to make up for residual inefficiencies of the allotment system.

4.3 Responding to Inefficiencies in the Communal Allotment Mechanism

Approximately 30% of the variation in allotment size remained unexplained in the specifications of Table 9. Several scholars note that the communal adjustment mechanism worked imperfectly to adjust land to household characteristics (e.g. Crisp, 1978). This assertion is a central component of Gerschenkron’s argument, for it acknowledges that the communal system forced households to hold onto inefficient amounts of land and labor. One way to think about this is to consider the variance of land-labor ratios over time. If the communal mechanism lagged in responding to changes in household characteristics, then the variance of the factor ratio should increase since the time the allotment was adjusted.⁸⁶ Table 10 explores this pattern for the subset of households that reported years with the current allotment.⁸⁷ Comparing those reporting less than 5 years with those answering 5-10 years, the variance of the land-labor ratio does increase (the p-value on the χ^2 test is 0.001). However, this pattern does not hold for longer periods. The variance for those holding their allotment longer than 10 years first falls (10-15 years, p-value 0.014) and then rises again.⁸⁸ This pattern is only weakly suggestive of increasingly inefficient land allotments over time. However, that there was variance in the land-labor ratio at all, if measured correctly, is consistent with some frictions in the communal allotment mechanism.

Tables 12 and 13 analyze the implications of such an unadjusted land allotment for household resource strategies. I construct a measure of labor change under the period of allotment based on the composition of the household in 1899 and the years with the current allotment.⁸⁹ This variable is equal to the household labor supply in 1899 minus the projected supply at the original time of allotment. The difference in the two stems from the implied

⁸⁶This assumes that at the time of the allotment, the land-labor ratio was set optimally.

⁸⁷Including households who answered “long ago” (by assigning them years as described in the Appendix) did not qualitatively change this pattern.

⁸⁸The variance when allotment years exceeds 15 is statistically indistinguishable from the 0-5 year category.

⁸⁹This variable is summarized in Table 12 and discussed in greater detail in the Appendix.

change in the age and sex structure of the household. Thus, it assumes no mortality or fundamental changes in household structure over the allotment period, and so it is likely an overstatement of the true change in labor resources.⁹⁰ The mean of this hypothetical change in household labor supply was 0.49 adult male equivalents for those reporting a year and 0.68 when households stating that the current allotment was in their possession “for a long time” are assigned a year (see the Appendix). This measure proxies for potential inefficiencies in matching land to labor resources that arose from lags in the communal allotment mechanism.

Table 13 displays the results from re-estimating the models of Tables 6 and 7 with this hypothesized measure of labor supply change in place of the mortality shock variable. Large values of this measure correspond to greater increases in household labor supply since the current allotment was granted. This table reports specifications using the more expansive measure (with households who answered “long ago”), but the results are very similar with the more narrowly defined variable.⁹¹ The results are similar to those displayed in Table 10 in all but a few notable cases.⁹² Households who answered “long ago” were more likely to rent out land. This is puzzling, especially since they worked less off the farm (49% of total time versus 57% in the full sample) and other determinants are controlled for. One explanation could be that households who answered vaguely about the years with their current allotment possessed land that was unsuitable in some other way or inconsistent with unobservable characteristics of the household. Households with lower agricultural ability may have been less inclined to report how long they held an allotment, or keep the land at all.

Larger potential gains in household labor from the time of allotment to 1899 were positively correlated with a greater release of (marginal) household labor off the farm and less hiring of task workers, although the latter effect was muted when allotments were relatively large (the fourth and fifth columns). In the case of renting land, there is weak evidence (significant at the 15% level) that gaining more labor by 1899 was negatively related to renting out land. This exercise suggests that lags in the allotment adjustment system could be dealt with through labor market activity or, more tentatively, by reallocating land through the

⁹⁰Members may have left via marriage or death during the course of the allotment and were not observed. I do not include individuals who died after 1897 are not included. The results are qualitatively the same if members who died since 1897 are included.

⁹¹A dummy variable controls for the households reporting “long ago.” Conditional logit versions of these specifications resulted in qualitatively similar findings.

⁹²Hiring workers and working off the farm were “properly” correlated with land-labor ratios. Literate household heads were more likely to hire workers, female-headed households were less likely to rent land or hire workers but more likely to work outside agriculture, and wealthier households appear to have specialized in agriculture by renting in land and hiring workers.

rental market.

4.4 Extensions

Russian households made resource allocations jointly across several margins. For example, their decision to rent land out was made simultaneously with their decision to allocate more labor off the farm. In Tables 6, 7, 10, and 13, the different mechanisms were modeled to be independent of each other. I made a number of simple extensions to tackle this issue.⁹³ First, Table 14 present a cross-tabulation of land rentals against labor hiring. Each cell displays the number of households (in percent of the sample), the percentage of household time worked off the farm, and the land-labor ratio. Three point are important here. First, the time spent working on the farm is monotonically related to the rental decision. Second, households hiring labor possessed more land than those not hiring. And third, hiring labor and working off the farm were not related.⁹⁴ This suggests that these different market mechanisms were jointly employed by households.

To better understand the joint decision, I separated households into three groups: renting out land or hiring labor, renting in land, or remaining self-sufficient.⁹⁵ I then estimated an ordered probit model of responses to the mortality shock of Tables 6, 7, and 10. This specification assumes, sensibly, that these groupings reflect a ranking of responses to the household labor shock.⁹⁶ To complete this analysis, I also split the sample at the median value for household time spent off farm and estimated the model. Select results are displayed in Table 14 and compared to a linear specification that includes village fixed effects and a measure of off-farm work.⁹⁷

The results presented in Table 15 reinforce the previous findings that households were utilizing several margins of adjustment simultaneously. The linear specification shows that in general, households did re-allocate resources in response to the mortality shock and that a recent reallocation dampened the need for this. I find that households heavily engaged in off-farm activities were the ones who adjusted to the mortality shock by renting out land or

⁹³In the study of Bedi and Tunali (2004), they test for market imperfections by explicitly estimating a joint model across different household adjustments. Their model does not specify the institutional reasons for their specifications, and it makes some heroic demands of the data. For simplicity and due to data reasons, I choose to approach outlined here.

⁹⁴Sadoulet et al. (1998) notes that perfect markets would imply that no households would send labor out and hire labor in (if they were of the same skill-type). My measure takes seasonality into account, and so I cannot conclude that markets were imperfect because households did both.

⁹⁵I use the measure of labor hiring that includes task workers and summer hires.

⁹⁶Renting out land or hiring labor is assigned 1, self-sufficiency - 0, and renting in -1. Only the marginal effects for the probabilities of outcomes 1 or -1 are reported in Table 15.

⁹⁷I also split the sample for the linear model, which gives qualitatively similar results with less precision.

hiring labor in. This suggests that the households with limited non-agricultural employment opportunities may not have been able to tap other means for adjusting resources. This may reflect the unequal impact of the communal frictions when the political economy of the commune favored richer households (Mironov, 1986). Limited documentation on the internal workings of the commune prevent a deeper exploration of these findings.

Adjustments were unlikely to have been limited to labor and land market activity. Capital played an important role in agricultural production, and households may have responded to distortions in another market by adjusting through capital. Unfortunately, the data does not present sufficient information to incorporate capital into the analysis.⁹⁸ Similarly, household demographics may have responded to changes in the shadow value of household labor. Households may have divided, retained relatives, or timed marriages in response to communal distortions or shocks to factor ratios. Most households acknowledged receiving a new allotment at the time of household division (Table 8). Extending the analysis of mortality shocks to include daughters marrying out of the household since 1897 does little to change the results.⁹⁹ These other mechanisms of factor adjustment imply that the results of Tables 6, 7, 10, 13, and 15 may be understatements of the actual factor re-allocations undertaken by households when mortality struck or the commune failed to adjust allotments.

5 Concluding Remarks

According to Gregory (1997), the appropriate estimate for industrial growth from 1887 and 1913 is between 6 and 6.7% per year. This exceeds the most recent estimates of industrial growth in the United States in the same period – about 5% (Davis, 2004). Although the majority of Russia’s population remained rural until well into the 20th century, industry emerged in rural areas and in several booming urban environments (Allen, 2003; and Bradley, 1985). Migration and labor mobility were prominent features of the economy in these regions of Russia. As transportation improved, markets became more integrated, which helped fuel the movement of labor and the emergence industrial sector. The *level* of Russian per capita

⁹⁸Simply adding livestock as a control variable is not appropriate, because the stock of animals is jointly determined with all the other outcome variables. I was able to measure seasonal investment (or de-stocking) in livestock by households between the summer of 1898 and the winter of 1899. Assuming that a change in the number of animals was a proxy for capital adjustments, I re-estimated models as in Table 10. Results were inconclusive and are available in the Technical Appendix.

⁹⁹These results are available in the Technical Appendix. There are numerous other demographic adjustments that could be mentioned. Authors such as Atkinson (1973) have even suggested that the relatively high-pressure demographic regime, with large household sizes and early marriage, may be a result of the communal system guaranteeing land.

income may have been low, but this growth story sounds remarkably similar to the recent experience of many developing countries today.

Alexander Gerschenkron's theory of Russian economic backwardness was based on his interpretation of the peasant land commune and his observations about the structure and growth of Russian industry. The research of Paul Gregory (1973, 1982, 1994, and 1997) has shown that Gerschenkron's view of Russian economic and industrial growth was inaccurate – growth was strong from an early period (before the reforms of the 1900s) and was not overly capital intensive. Gregory (especially 1994) and others have also remarked on the apparent flexibility of Russian households' factor allocations within the communal framework. This paper presents the first micro-evidence in support of this revised view of the land commune. Russian peasants were not forced to rely purely on the communal land allotment mechanism. Rather, households engaged in land and labor transactions that allowed them to adjust to changes in the marginal product (or shadow value) of household these factors. Whether these changes were driven by mortality shocks or lags in the allotment mechanism, households reacted by adjusting labor via hiring and reallocations of household labor. Land rentals and the allotment system worked closely together to approximate a land market. This allowed households to specialize in agriculture and adjust to longer-term distortion in factor ratios. Households were able to make resource decisions simultaneously along several margins. All this suggests that features of the commune did not create prohibitively large distortions of the prices of factor services. Households could enter into transactions in one or another market, or through the commune itself, when changes occurred in a factor's shadow value.

This analysis cannot evaluate the full costs of the land commune for Russian development (see also Nafziger, 2005). Peasant households made economically rational resource decisions when the situation demanded it. The findings of this paper suggest that the commune did not overtly interfere in factor mobility. More research is necessary to understand the full economic consequences of this uniquely Russian institution.

Appendix

The sample households were all enumerated in early 1899. Hence, the data on yields and farming practices references the agricultural cycle beginning with winter planting in 1897, continuing through the planting of spring crops in 1898, and ending in harvests in August and September of 1898. Livestock totals refer to animals possessed during the agricultural year. The information on housing, occupations, demographics, and land pertains to early 1899.¹⁰⁰ In moving from the survey cards housed in TsIAM to the variables employed in this paper, a number of important assumptions and definitions were employed. This appendix discusses several key aspects of the collection and coding of the data. Further information can be obtained in a lengthier Technical Appendix available on request.

Variable Definitions, Sources, and Derivations

Numerous variables were coded and defined in particular ways to arrive at the final data used in this paper. This sub-section outlines the assumptions and derivations behind several important variables (others are summarized in Table 2).

Occupation Information on occupations was taken from the household returns. Specific job descriptions were classified into the occupational classes in Table 3 with the help of the 1897 National Census (*Pervaia*, 1905).

Work Location These were specified or defined as the location of the factory where the individual worked. These locations were then classified with the help of Semenov (1899).

Household Labor This is the labor supply of the household in adult male equivalents. The coefficients applied to construct the index were: both sexes (0-9 years) - 0, both sexes (10-15) - 0.5, females (16-55) - 0.66, males (16-17) - 0.5, males (18-60) - 1, females (> 55) - 0.66×0.75, males (> 60) - 0.75. These were adopted after a brief survey of the literature and reflect contemporary age classifications.

Soul Shares This is the number of shares of communal allotment land held by the household. Households who did not respond to this question were entered as having no shares (n = 23).

Allotment This is the acres of arable land held by the household. It was derived by taking the total amount of communal arable from the tables in *Moskovskaia* and dividing by the number of total shares. This average share size was then multiplied by *soul shares* and the result was multiplied by 2.74 to convert to acres (from the Russian unit *desiatina*). This measure excludes communal pasturage, forests, hay lands, and waste land.

Land-Labor Ratio I divided the household's *allotment* by *household labor*.

Allotment Years 407 households reported an exact number between 0 and 33 years. A further 141 households reported some version of "for a long time" (*davno*). These 141 were assigned the allotment year at the 95th percentile of the village distribution. Other percentiles were also attempted. These households are characterized in Table 8 and denoted with a dummy variable in the regressions of Tables 10 and 12.

Sq. Feet of Housing This was taken from the household's main structure and converted from the Russian measure *arshin* equal to 28 inches.

Horses (Similar for *Cattle*) Maximum number (in summer or winter) held by the household. All ages are included. The Technical Appendix discusses the seasonality of livestock holdings and implications for the results of the paper.

¹⁰⁰Ages were initially entered from the 1897 census and then updated to take into account the time lapsed by 1899. However, this process added an additional year to ages for those present in 1897 (*Moskovskaia*, vol. 1, 1903, p. XIX). This was done by the zemstvo researchers to create age-distributions corresponding to 1900 for all enumerated households, regardless of when they were actually surveyed. Correcting for this has negligible implications for the results presented below.

% Months Non-Ag The survey reported the months and seasons worked by individuals in occupations other than farming. Unfortunately, there were many individuals who did not report one or both of these. To solve this problem, I began with individuals reporting months worked. I converted reported seasons to months (3 months per season) and used this when observations on months were missing. An average was taken when both seasons and months were reported. This provided information on 3425 individuals. I derive the remaining observations from predicted values obtained in a regression of months off-farm on age, sex, literacy, occupation, and village-level fixed effects. Except for some minor corrections, this was the final individual measure used in the analysis. To arrive at a household-level indicator, these months off-farm were divided by 12 and summed over the household (and then weighted to put in adult male equivalents to arrive at the “weighted” measure). Variations in the techniques employed had no qualitative impact on the final measure, but some unavoidable measurement error was likely introduced in the process.

Renting Out and In Land Both measures were defined from specific questions in the survey or gleaned from qualitative information entered in the household responses. Answers were not sufficiently detailed to distinguish the amount or price of the rented land. I was able to classify land rented in by type (see Table 6) under assumptions about certain answers. This process is detailed in the Technical Appendix.

Hiring Labor The hiring of summer agricultural workers was explicitly addressed in the survey. Hiring for task work was coded from qualitative descriptions of farming practices and questions on how households worked their land. It was difficult to distinguish what type of task work was undertaken. Including lodgers and resident workers in this measure (who were unlikely to have been employed on household land) had no effects on the results.

Household Labor: Mortality “Shocks” and Hypothetical Changes

For each household enumerated in the 1897 Russian national census, the survey response card was initially filled out with basic demographic information on each member. When enumerators then went to each village, they corrected this information by adding cards for new households, adding and subtracting members of existing households, and updating ages and the identities of household heads (*Moskovskaia*, vol. 1, pp. XIII-XIX). Many households cards were initially marked with members who then exited the household by 1899. These exits took three forms. A large number of females married and moved out the household (see the discussion in the text). A small number of individuals simply disappeared by 1899. The remaining absent members passed away between 1897 and 1899.¹⁰¹ I construct a measure of the implied impact of a dead household member by weighting each death by its contribution to household labor evaluated at the individual’s projected age in 1900.¹⁰² I then subtracted the actual amount of household labor at the time of the survey from this hypothetical amount to arrive at the measure of *labor shock*. This measure is summarized in Table 5.

The second measure of factor distortions utilizes information from the survey on the number of years each household was granted its current communal land allotment. I projected current ages back to the year of initial allotment, assumed that members in 1897 not present in 1899 were present at their projected ages, and derived a hypothetical household labor supply at that time. This measure assumes so intermediate mortality or entry/exit from the household other than what occurred since 1897. Thus, it is likely to be an understatement of actual household labor at the date of initial allotment (since members working elsewhere were still assigned to the household and included on the response cards). To arrive at the potential change in household labor over the allotment period, I subtracted this hypothetical measure from the household labor supply in 1899. Only households reporting a number for the years of current allotment were used, but the results are very similar if households reporting “for a long time” are included. This measure is summarized in Table 12.

¹⁰¹The 1897 census was executed in January. Hence, there was a window of approximately 2 years in which these individuals passed away.

¹⁰²These weights are given in the definition of *household labor* above. This corresponds to the ages entered by enumerators for all members present in 1897. See above.

Table 1: Summary Statistics, Village Data

Villages	Former Peasant Type	Households		Total Soul Shares	Acres Per Soul	Total Souls in Sample	Males in Industry % of Total	Females in Industry % of Total
		Total	With Land					
Gorenosovo	State	58	52	126	4.07	121	57.8	64.9
Dedkovo	Serf	10	7	15	6.58	15	65.0	14.3
Zakharkovo	Serf	74	66	95	3.61	86	54.9	59.6
Il'inskoe	Serf	143	120	324	2.39	189.5	57.6	31.4
Krasnovidovo	Serf	53	46	132	3.33	130	51.4	11.4
Kriukovo	Serf	47	43	101	4.67	85	36.6	6.7
Lamonovo	Serf	11	10	32	5.14	32	40.5	5.0
Afonasovo	State	10	16	34	8.88	34	44.4	46.0
Vysokovo	State	38	30	48	9.49	47	60.0	42.6
Gorodok	State	58	44	120	5.46	120	58.2	13.3
Koros'kovo	State	9	8	14	12.43	13	51.6	7.9
Kos'kovo	Serf	34	27	70	3.97	63	63.0	71.0
Kresty	Serf	22	15	44	5.74	42	61.9	64.6
Lychevo	Serf	26	18	28	9.32	25	57.1	33.3
Petrishevo	Serf	28	23	40	8.67	39	63.2	50.0
Podosen'e	State	23	23	57	4.42	57	40.5	36.1
Rakhmanovo	State	68	51	128	4.42	126	52.1	30.5
Riazantsy	State	27	22	51	5.80	47	56.2	31.3
Spasskoe	Serf	45	30	43	6.13	30	55.9	22.1
Totals		784	651	1502	-	1301.5	-	-
Means and Proportions		41.3	34.3	79.1	4.5	68.5	53.9	34.7

Note: Data come from *Moskovskaia* (1903-1908) and from the household sample. The top 6 villages are from Pavlovskaja township, and the bottom 13 are from Morozovskaja. *Households* include those assigned to the village, those with allotment shares, and those in the sample. *Communal souls* and *Acres per soul* are the number and average size of allotment units of arable land. *Total souls in sample* are the shares held by the sample households. *Industry* includes any non-farm work by those in assigned households. These last two variables are taken from the village tables.

Table 2: Summary Statistics, Archival Sample

	Mean/Portion	SD	Min	Max	N
A. Individual Data					
Age	27.143	20.236	0.083	95	4005
Sex (female = 1)	0.528	–	0	1	4016
Literacy (literate = 1)	0.41	–	0	1	3053
Months in non-farm activities	6.451	4.936	0	12	3069
<i>Weighted, in adult male equivalents^A</i>	4.868	4.116	0	12	3069
B. Household Data					
Age of household head	48.025	13.985	16	82	647
Sex of household head (female = 1)	0.074	–	0	1	647
Literacy of household head (literate = 1)	0.481	–	0	1	647
Household size	6.524	3.172	1	24	647
<i>Weighted, in adult male equivalents</i>	3.327	1.539	0	9.295	647
Communal allotment shares (<i>Souls</i>)	2.012	1.217	0	9	647
Acres of allotment (arable land)	9.642	6.833	0	36.599	647
<i>Arable and pasture</i>	15.3	12.65	0	83.257	647
<i>All land types</i>	24.644	20.434	0	115.043	647
Land-labor ratio (Arable acres / household labor)	2.91	1.861	0	8.832	647
Portion renting land out (all land types)	0.10	–	0	1	647
Portion renting land in (all land types)	0.413	–	0	0	647
<i>Portion renting arable land in</i>	0.178	–	0	1	647
<i>Portion renting pasture in</i>	0.253	–	0	1	647
Portion hiring summer workers	0.076	–	0	1	647
<i>Hiring summer or task workers</i>	0.207	–	0	1	647
<i>Hiring summer, task, or other workers^B</i>	0.23	–	0	1	647
Portion of household’s months working off-farm	0.426	0.216	0	1	647
<i>Weighted, in adult male equivalents</i>	0.568	0.231	0	1	647
Total head of cattle	1.641	1.357	0	9	647
Total horses	1.142	1.347	0	13	647
Square feet of main dwelling	438.126	256.987	0	2341.111	647

A - Adult male equivalent is defined in the Data Appendix.

B - Other workers include lodgers, nannies, and “workers” (*rabotniki*).

Note: Data come from Moscow household survey as described in the text. In Part A *Age* excludes 11 missing observations. *Literacy* denotes those in school as literate and excludes individuals younger than 10 years old (as does *Months in Non-Farm*). Household head variables are defined as in Part A. *Household size* and *household labor* exclude male soldiers ($n = 41$) and residents who are not household members ($n = 26$). 141 households reported the period with their current allotment as “for a long time.” 102 households reported receiving their allotment since 1897. 99 households did not report anything for the period of allotment (75 of these had no allotment). The total numbers of *cattle* and *horses* include young livestock. All other variables are defined in the Data Appendix.

Table 3: Occupations, Work Locations, and Farming Decisions

A. Distribution of Occupations by Work Location

Occupations	Work Locations					Total
	1	2	3	4	5	
On-farm or in the home	860	7	3	18	4	892
Local agricultural laborer	47	0	0	0	0	47
Transportation, trading, sales	154	22	13	62	2	253
Service (e.g. domestics)	31	15	17	60	10	133
Agricultural trades	63	7	1	18	0	89
Factory work (skilled and unskilled)	36	48	72	33	5	194
Skilled artisans	159	12	27	86	3	287
Protoindustrial (e.g. textiles)	739	97	52	46	6	940
Professional	19	3	9	8	0	39
In school	113	6	1	4	0	124
Other	47	0	1	0	0	48
Total	2268	217	196	335	30	3046

Work Locations

- 1** In the township or on-farm
- 2** In the rest of the district
- 3** In another district of the province
- 4** In Moscow
- 5** In another province

B. Gender Division of Work

	Males	Females	Total
Individuals working on the farm	252	608	860
Individuals working outside the township	516	262	778

C. Household Farming Decisions

	N
Farm with household labor only	411
Farm with the help of hired summer labor	49
Farm with some hiring for specific tasks	85
Do not farm allotment or fully rent out land	28
Possess land but farming decision unknown	17
No allotment or rented land	57
Total	647

Note: Data come from the Moscow household survey. Data are for all individuals over 9 years of age. The classifications of *occupations* and *work location* are described in the Data Appendix. *Other* includes military service, prison, and begging. In Part C, households that farm their allotments using only household labor may rent out some of their land.

Table 4: A Closer Look at Rental Market Activity

A. Who households rented land with

	Rent In	Rent Out
Relative	8	2
Local priest	8	0
Village elder or the commune	76	21
Local peasant	75	37
Peasant outside village	40	0
Private landowner (nobility)	54	0
Merchant	19	0
State	7	0
Different people	3	0

B. Household rental payments

	N	Mean Payment	SD
Cash	254	12.14	12.89
Allotment obligations (redemption)	14		
Labor services	8		
Non-redemption obligations	2		
Free rental	4		

Note: Data was taken from the Moscow household survey as described in the text. The information in Parts A and B covers all the non-missing observations of these variables. Payment information is in rubles.

Table 5: Mortality/Labor Shock Measures

A. Age Distribution of Shock Incidence

	Number Dead	Households Affected
Ages 0-9	56	49
Ages 10-60	51	49
Older than 60	38	37

B. Impact of Mortality Shocks

Households Affected	Labor Effect	Household Size	Household Labor (Actual)
Yes, n=88	0.766	7.65	3.25
No, n=559	0	6.35	3.34

Note: Data is from the Moscow household survey. Information refers to the measure of *labor shocks* as defined in the Data Appendix and discussed in the text. Ages are from 1897. Affected households in Part B are those for whom the *labor shock* resulted in a non-zero loss of household labor in adult male equivalents (summarized by Mean Labor Effects). *Household size* and *household labor* are defined as in Table 2. *Household labor* is evaluated for those in the household at the time of the survey in 1899.

Table 6: Responding to Mortality Shocks, Renting Land

Dependent Variables	Renting Out Land			Renting In Land		
	Logit	OLS, FE	Logit, FE	Logit	OLS, FE	Logit, FE
Models						
Land-labor ratio	-0.015* (1.65)	0.007 (1.72)	0.0312 (1.54)	0.003 (0.16)	0.021* (1.76)	0.021* (1.82)
Household head, age	0.000 (0.25)	-0.000 (0.48)	-0.002 (1.01)	-0.003* (1.68)	-0.001 (0.83)	-0.001 (0.80)
Household head, sex	-0.013 (0.39)	-0.023 (0.56)	-0.064 (0.77)	-0.268*** (3.24)	-0.254*** (3.55)	-0.383*** (3.17)
Household head, literacy	0.060* (1.82)	-0.011 (0.67)	-0.046 (1.29)	0.079 (1.23)	0.030 (0.69)	0.015 (0.42)
Sq. feet of housing × 100	-0.016*** (3.68)	-0.010*** (3.32)	-0.045 (2.60)	0.059*** (3.94)	0.044*** (5.50)	0.050*** (4.09)
Mortality/labor “shock” <i>Adult male equivalents</i>	0.038 (0.56)	0.049 (0.52)	0.046 (0.26)	0.005 (0.05)	-0.030 (0.32)	-0.035 (0.34)
“Shock” × Land-labor	0.007 (0.37)	0.004 (0.17)	0.040 (0.65)	-0.011 (0.29)	0.004 (0.14)	0.008 (0.23)
Observations	647	647	486	647	647	620
R ²		0.13			0.22	
Log-likelihood	-198.08		-149.14	-400.86		-322.94
F-Statistic		2.08			15.64	
χ ² Statistic	52.68		177.37	45.85		82.62

Dependent Variables	Renting In Arable			Renting In Pasture		
	Logit	OLS, FE	Logit, FE	Logit	OLS, FE	Logit, FE
Models						
Land-labor ratio	-0.049*** (3.15)	-0.005 (0.41)	-0.009 (0.25)	0.043** (2.46)	0.027** (2.44)	0.036*** (2.62)
Household head, age	-0.001 (0.62)	-0.000 (0.33)	-0.000 (0.26)	-0.001 (0.61)	-0.000 (0.33)	-0.001 (0.46)
Household head, sex	-0.109* (1.92)	-0.044 (0.78)	-0.124 (0.87)	-0.171*** (2.89)	-0.208*** (3.21)	-0.476 (4.56)
Household head, literacy	0.001 (0.04)	-0.011 (0.36)	-0.040 (0.60)	0.106 (1.51)	0.053* (1.88)	0.062** (2.08)
Sq. feet of housing × 100	0.028** (2.23)	0.028*** (3.56)	0.052 (3.14)	0.021** (2.43)	0.024** (2.56)	0.033*** (2.58)
Mortality/labor “shock” <i>Adult male equivalents</i>	-0.046 (0.49)	-0.076 (1.06)	-0.177 (0.73)	0.038 (0.45)	0.045 (0.64)	-0.006 (0.06)
“Shock” × Land-labor	0.011 (0.31)	0.016 (0.72)	0.055 (0.55)	-0.020 (0.78)	-0.016 (0.75)	-0.012 (0.38)
Observations	647	647	488	647	647	539
R ²		0.24			0.31	
Log-likelihood	-275.16		-198.57	-336.39		-219.97
F-Statistic		2.35			3.92	
χ ² Statistic	78.98		233.03	33.33		76.78

Absolute z (logit) and t-statistics (OLS) are in parentheses.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%

Note: Data come from the Moscow household survey. The dependent variables = 1 when the household is renting land out or in, and 0 otherwise. *Renting out* and *renting in* = one if *any* type of land is rented out or in. Logit coefficients are marginal effects evaluated at the sample means. Z and t statistics are robust to village clustering of the error terms. FE stands for fixed-effects, which are defined at the village level. *Land-labor ratio*, *labor “shock”*, and the other variables are defined in the text and Data Appendix and summarized in Tables 2 and 7.

Table 7: Responding to Mortality Shocks, Labor Allocations

Dependent Variables	Hiring, Summer Work			Hiring, Summer or Task Work		
	Logit	OLS, FE	Logit, FE	Logit	OLS, FE	Logit, FE
Land-labor ratio	0.004 (0.84)	0.008 (1.24)	0.008 (1.08)	0.038** (1.98)	0.036** (2.67)	0.024* (1.90)
Household head, age	0.001 (1.11)	0.001 (0.76)	0.000 (1.22)	0.002 (1.18)	0.001 (0.56)	0.000 (0.18)
Household head, sex	0.018 (0.45)	0.036 (1.16)	0.006 (0.25)	-0.072 (0.81)	-0.020 (0.29)	-0.055 (0.47)
Household head, literacy	0.056* (1.64)	0.043 (1.53)	0.029 (1.21)	0.078 (1.63)	0.077* (2.02)	0.038* (1.73)
Sq. feet of housing × 100	0.012*** (3.27)	0.031*** (3.72)	0.013 (0.89)	0.033*** (3.18)	0.037*** (4.76)	0.019 (1.54)
Mortality/labor “shock” <i>Adult male equivalents</i>	-0.043 (1.03)	-0.011 (0.22)	-0.002 (0.04)	0.078 (0.65)	0.165** (2.11)	0.107* (1.70)
”Shock” × Land-labor	0.008 (0.94)	-0.006 (0.51)	-0.002 (0.48)	-0.019 (0.61)	-0.057** (2.34)	-0.033* (1.66)
Observations	647	647	464	647	647	588
R^2		0.17			0.28	
Log-likelihood	-148.86		-102.64	-290.84		-201.62
F-Statistic		2.94			5.55	
χ^2 Statistic	39.65		46.91	23.40		86.16

Dependent Variables	% Months Non-Ag, Unweighted		% Months Non-Ag, Weighted	
	OLS	OLS, FE	OLS	OLS, FE
Land-labor ratio	-0.034*** (5.67)	-0.033*** (4.93)	-0.038*** (5.01)	-0.028*** (3.55)
Household head, age	-0.000 (0.25)	-0.000 (0.94)	-0.002** (2.13)	-0.002*** (3.67)
Household head, sex	0.102** (2.38)	0.097** (2.17)	0.057* (1.76)	0.059* (1.85)
Household head, literacy	-0.013 (0.59)	-0.028* (1.90)	-0.002 (0.08)	-0.036** (2.13)
Sq. feet of housing × 100	-0.000 (0.08)	0.000 (0.02)	-0.005 (0.80)	-0.003 (1.13)
Mortality/labor “shock” <i>Adult male equivalents</i>	-0.136** (2.55)	-0.128** (2.74)	-0.045 (0.80)	-0.050 (1.23)
”Shock” × Land-labor	0.008 (0.61)	0.006 (0.45)	0.002 (0.14)	0.000 (0.01)
Observations	647	647	647	647
R^2	0.13	0.31	0.13	0.39
F-Statistic	15.77	12.03	10.10	12.77

Absolute z (logit) and t-statistics (OLS) are in parentheses.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%

Note: Data come from the Moscow household survey. In the top part of the table, the dependent variables = 1 when the household is hiring a summer worker or hiring a summer or task worker, and 0 otherwise. Logit coefficients are marginal effects evaluated at the sample means. In the second part, the dependent variable is the portion of total months worked by household members in non-agricultural activities. *Weighted* refers to adult male equivalents of the months worked. Z and t statistics are robust to village clustering of the error terms. FE stands for fixed-effects, which are defined at the village level. The dependent variables, *labor “shock”*, and the other variables are defined in the text and Data Appendix and summarized in Tables 2 and 7.

Table 8: Understanding the Current Communal Allotment

A. Reasons for the Current Allotment

	Number of households	Mean Change in Acres
Division of old household	102	-7.32
Community-wide land reallocation	7	2.94
Household member came-of-age	41	4.93
Household member became too old	3	-5.18
Household member died	11	-7.22
Household member left (via marriage, etc.)	4	-5.51
Gained through marriage	2	5.08
Son returned from military service	1	9.32
Commune took away land	1	-12.26
Took land from the commune	1	5.80
Gave land away	1	-4.42

B. Years With the Current Allotment

	Mean	SD
Version 1, n=407	8.53	7.21
Version 2, n=548	11.76	8.98

Note: Data come from the Moscow household survey as described in the text. Data in Part A were coded from the subset of households that provided reasons for their current allotments. The mean change in acreage associated with each reason corresponds to households reporting a prior allotment size. In Part B, the minimum value for each version is 0 and the maximum is 33. Version 1 reports only for those households that provided a number of years. Version 2 was defined by placing households reporting “long ago” (n = 141) at the 95th percentile of their village’s distribution of years with the current allotments.

Table 9: Correlates of the Acres of Communal Allotments

Household size	0.945*** (6.729)	–	–	–	–
Household head, age	0.041*** (3.305)	0.011 (0.923)	0.006 (0.627)	0.004 (0.323)	0.018 (1.140)
Household head, sex	-4.630*** (6.734)	-3.472*** (5.431)	-2.811*** (4.984)	-3.097*** (4.774)	-3.180*** (3.483)
Household head, literacy	0.048 (0.152)	0.040 (0.146)	-0.097 (0.307)	-0.032 (0.119)	0.122 (0.423)
Sq. feet of housing × 100	0.456*** (3.716)	0.454*** (4.183)	0.251** (2.846)	0.415*** (3.806)	0.429*** (4.329)
Household labor <i>Adult male equivalents</i>	–	2.201*** (7.682)	1.783*** (7.202)	2.297*** (7.908)	–
Horses	–	–	0.584*** (3.550)	–	–
Cattle	–	–	1.063*** (5.605)	–	–
% Months worked off the farm <i>Over all household members</i>	–	–	–	-2.749*** (3.115)	–
Males, 0-9	–	–	–	–	-0.149 (0.790)
Females, 0-9	–	–	–	–	0.478** (2.863)
Males, 10-15	–	–	–	–	0.936** (2.560)
Females, 10-15	–	–	–	–	0.525 (1.689)
Males, 16-25	–	–	–	–	1.669*** (6.981)
Females, 16-25	–	–	–	–	1.175*** (4.105)
Males, 26-60	–	–	–	–	2.497*** (7.088)
Females, 26-55	–	–	–	–	1.741*** (4.835)
Males, over 60	–	–	–	–	1.304* (1.827)
Females, over 55	–	–	–	–	0.958* (2.004)
Observations	647	647	647	647	647
R^2	0.66	0.69	0.73	0.69	0.70

Absolute t-statistics are in parentheses and are robust to village clustering.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%

Note: Data were taken from the Moscow household survey. The dependent variable is the acres of communal arable allotment held by each household. Models are all OLS with village-level fixed effects. Variables are defined and summarized in Table 2, Table 7, and the Data Appendix.

Table 10: Responding to Mortality Shocks, Communal Adjustments

Dependent Variables Model	Renting Land		Hiring Labor		% Months Non-Ag	
	Out OLS, FE	In OLS, FE	Summer OLS, FE	Any OLS, FE	No Weights OLS, FE	Weights OLS, FE
Land-labor ratio	0.009* (2.001)	0.021 (1.607)	0.009 (1.245)	0.039** (2.746)	-0.033*** (4.948)	-0.029*** (3.768)
Household head, age	-0.000 (0.648)	-0.001 (0.725)	0.001 (0.765)	0.001 (0.488)	-0.000 (0.911)	-0.002*** (3.662)
Household head, sex	-0.019 (0.465)	-0.260*** (3.429)	0.031 (0.972)	-0.022 (0.317)	0.096** (2.182)	0.058* (1.919)
Household head, literacy	-0.009 (0.562)	0.027 (0.574)	0.040 (1.456)	0.076* (1.963)	-0.028* (1.871)	-0.036** (2.140)
Sq. feet of housing × 100	-0.011*** (3.118)	0.045*** (5.683)	0.032*** (3.702)	0.038*** (4.825)	-0.000 (0.004)	-0.003 (1.069)
Mortality/labor “shock” <i>Adult male equivalents</i>	0.049 (0.529)	-0.008 (0.073)	-0.023 (0.610)	0.175* (1.998)	-0.132** (2.572)	-0.046 (1.007)
“Shock” × Land-labor	0.001 (0.054)	0.007 (0.224)	-0.005 (0.412)	-0.060** (2.418)	0.007 (0.502)	0.001 (0.087)
Recent allotment <i>Since 1897</i>	-0.049* (2.042)	0.025 (0.375)	-0.001 (0.036)	-0.071 (1.578)	0.013 (0.576)	0.027 (0.928)
Recent × “Shock”	0.046 (0.622)	-0.162 (0.967)	0.044 (0.580)	-0.015 (0.135)	0.012 (0.239)	-0.038 (0.733)
Allotted land “long ago” <i>= 1 if such a response</i>	0.034 (1.159)	-0.056 (0.930)	-0.042 (1.509)	-0.005 (0.202)	-0.008 (0.338)	-0.008 (0.453)
Observations	647	647	647	647	647	647
R ²	0.14	0.22	0.17	0.29	0.31	0.40
F-Statistic	5.89	15.11	2.05	3.84	22.89	17.78

Absolute t-statistics are in parentheses.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Note: Data come from the Moscow household survey. Dependent variables are defined as in Tables 6 and 7. All models condition on village fixed effects. T-statistics are robust to village clustering of the error terms. *Recent allotment* equals 1 if the household received their current allotment since 1897 and 0 otherwise (see the Appendix). *Allotted land “long ago”* equals one if household answered in this way. These households were assigned a period of current allotment equal to the 95th percentile of the village distribution. The other variables are defined in the text and summarized in Tables 2 and 5.

Table 11: Variance of Land-Labor Ratios By Period of Allotment

Years With Current Allotment	N	Mean Land-Labor Ratio	SD of Ratios
Less than 5	152	3.12	1.61
5 to 10	98	3.18	2.16
10 to 15	59	3.36	1.25
Greater than 15	98	3.41	1.72
All	407	3.24	1.74

Note: Data come from the Moscow household survey. Information is from households reporting a number in answer to the question on the years with the current allotment (i.e. Version 1 of Table 8, n = 407).

Table 12: Changes in Household Labor Since Land Allotment

Version 1: Households reporting a year land was allotted	N	Mean	SD
1899 Labor supply	407	3.53	1.49
Projected supply at time of allotment	407	3.04	1.56
Implied change under constant allotment	407	0.49	0.95
Version 2: Households reporting a year or “long ago”			
1899 Labor supply	548	3.51	1.50
Projected supply at time of allotment	548	2.83	1.50
Implied change under constant allotment	548	0.68	1.11

Note: Data come from the Moscow household survey. All values are in adult male equivalents. The method for constructing projected labor supply at the time of allotment is outlined in the Appendix.

Table 13: Responding to Hypothetical Long-Run Labor Changes

Dependent Variables	Renting Land		Hiring Labor		% Months Non-Ag	
	Out	In	Summer	Any	No Weights	Weights
Model	OLS, FE	OLS, FE	OLS, FE	OLS, FE	OLS, FE	OLS, FE
Land-labor ratio	-0.018 (1.116)	0.006 (0.350)	0.011 (1.132)	0.031*** (3.490)	-0.028*** (4.871)	-0.033*** (6.080)
Household head, age	-0.000 (0.396)	-0.000 (0.177)	0.001 (0.980)	0.002 (1.082)	0.001 (0.988)	-0.001 (1.387)
Household head, sex	0.154 (1.257)	-0.291*** (4.272)	-0.040 (1.064)	-0.144 (1.709)	0.103* (2.024)	0.091* (1.863)
Household head, literacy	-0.009 (0.574)	0.039 (0.781)	0.052* (1.771)	0.101** (2.627)	-0.010 (0.557)	-0.020 (1.016)
Sq. feet of housing × 100	-0.014** (2.331)	0.041*** (4.654)	0.029*** (3.669)	0.032*** (4.078)	-0.001 (0.420)	-0.003 (1.034)
Long-run labor change <i>Adult male equivalents</i>	-0.032** (2.145)	0.044 (0.873)	-0.023 (0.878)	-0.073 (1.631)	0.037*** (3.251)	0.007 (0.476)
Labor change × Land-labor	0.006** (2.145)	-0.012 (0.706)	0.005 (0.454)	0.027 (1.531)	-0.004 (0.917)	0.003 (0.723)
Allotted land “long ago” <i>= 1 if such a response</i>	0.061** (2.288)	-0.092 (1.461)	-0.036 (1.180)	0.004 (0.165)	-0.022 (1.119)	-0.024 (1.396)
Observations	548	548	548	548	548	548
R-2	0.16	0.23	0.17	0.33	0.35	0.47
F	1.36	14.18	3.78	4.35	14.83	18.19

Absolute t-statistics are in parentheses.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Note: Data come from the Moscow household survey. All models condition on village fixed effects. T-statistics are robust to village clustering of the error terms. *Long-run labor change* is defined as the household labor supply today minus a hypothetical labor supply at the beginning of the period with the current communal allotment, all in adult male equivalents (see the Appendix for more detail on the meaning of “hypothetical”). *Allotted land “long ago”* equals one if household answered in this way. These households were assigned a period of current allotment equal to the 95th percentile of the village distribution. The other variables are defined in the Appendix and summarized in Tables 2.

Table 14: Tabulation of Household Adjustment Mechanisms

	Hiring Labor	Not Hiring Labor	Total
Renting Out Land	0.2%, <i>50.6%</i> , 1.09	8.0%, <i>52.2%</i> , 2.36	8.3%, <i>52.1%</i> , 2.31
Not Renting Land	10.2%, <i>43.3%</i> , 4.14	40.2%, <i>44.1%</i> , 2.61	50.4%, <i>44.0%</i> , 2.92
Renting In Land	9.9%, <i>39.6%</i> , 3.39	29.7%, <i>38.0%</i> , 3.03	39.6%, <i>38.4%</i> , 3.12
Total	20.4%, <i>41.6%</i> , 3.73	77.9%, <i>42.6%</i> , 2.75	100%, <i>42.4%</i> , 2.95

Note: Data come from the Moscow household survey. Households both renting in and renting out land are dropped (n = 11). Hiring labor refers to the measure including task workers. The first number is the percentage of the sample households in that cell. The second (italicized) percentage is the mean percentage of total household months spent working off the farm, not weighted by adult male equivalents. The bold-faced number is the mean land-labor ratio for the households in the cell. Columns do not add-up due to rounding.

Table 15: Adjusting to Mortality Shocks, Multiple Mechanisms

Sample Used	Full		Above Median Off-Farm Work		Below Median Off-Farm Work		Full
Model: $Pr(X_i B_i + u_i) =$	-1	1	-1	1	-1	1	Linear, FE
Land-labor	0.002 (0.173)	-0.001 (0.174)	-0.007 (0.482)	0.005 (0.466)	0.003 (0.173)	-0.001 (0.174)	0.010 (0.535)
Mortality “shock”	-0.047 (0.925)	0.027 (0.917)	-0.123** (2.123)	0.084** (1.982)	0.019 (0.250)	-0.009 (0.248)	0.146* (1.854)
“Shock” × Land-labor	-0.002 (0.106)	0.001 (0.107)	0.041 (0.828)	-0.028 (0.786)	-0.029 (1.452)	0.013 (1.447)	-0.033 (1.195)
Recent allotment <i>Since 1897</i>	0.021 (0.590)	-0.012 (0.583)	0.041 (1.107)	-0.026 (1.089)	0.022 (0.293)	-0.010 (0.299)	-0.115** (2.409)
Recent × Land-labor	-0.074 (0.590)	0.042 (0.543)	-0.382 (0.964)	0.262 (0.905)	0.003 (0.021)	-0.001 (0.021)	0.193 (1.010)
Observations	636	636	315	315	321	321	636

Absolute z (probit) and t (linear) statistics are in parentheses.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Marginal effects are reported at the full sample means or discrete changes (except for the linear model).

Note: Data come from the Moscow household survey. The table does not report results for household head or housing variables. The first six columns report estimated marginal effects from an ordered probit model (1 - renting out land or hiring in labor, 0 - self-sufficiency, and -1 - renting in land) as specified in text. The sample split occurs at the median value of the unweighted measure of the time spent by the household in off-farm work. Households who rented in and out land were dropped (n = 11). The linear model conditions on village fixed effects. Z and t-statistics are robust to village clustering of the error terms. Variables are defined as in Table 10.

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