Russian Serfdom and Emancipation: New Empirical Evidence

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Note to Readers: This paper is carved out of a much longer study that is increasingly looking like a book project. As such, some obvious extensions are left out. I apologize for any inconsistencies that remain.

Abstract

Serfdom is often viewed as a major institutional constraint on the economic development of Tsarist Russia, one that persisted well after emancipation occurred in 1861. However, scholars have generally asserted this causal relationship with few facts in hand. This descriptive paper introduces a variety of newly collected data, covering European Russia at the district (*uezd*) level, to describe serfdom, emancipation, and the subsequent evolution of property endowments among the rural population into the 20th century. A series of simple exercises describes several important ways that serfdom, itself, varied across European Russia; outlines how conditions differed between peasants formally classified as private serfs and those subject directly to the state; and connects these differences to long-run variation in land ownership and obligations. The empirical evidence explored in this paper constitutes the groundwork for considering the possible channels linking serfdom to Russia's slow pace of economic growth prior to Soviet period.

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"The year 1861 begot the year 1905."[2]

Introduction

Institutions matter for economic development.[3] In exploring this theme, scholars have turned to history, which offers the possibility of examining quasi "experimental" evidence of the consequences of different institutional arrangements for short and long run economic development (e.g. Acemoglu et al., 2002; Banerjee and Iyer, 2005; and Dell, 2010). One important strand of this growing literature investigates whether the institutional structure of slavery mattered for subsequent economic outcomes in Africa, the United States, and elsewhere (Acemoglu et al., 2012; Bertocchi and Dimicio, 2012; Miller, 2009; Nunn, 2008a, 2008b, and 2011). These studies have emphasized several possible channels of persistence, including human capital differences, cultural factors, and property inequality. In this literature, it is not just the direct legacy of slavery (possibly driving inequality) that influenced long-run outcomes, but it was also the manner by which the system ended. Emancipation and related reforms played a key role in consolidating economic and political inequality and may have affected the subsequent path of institutions and inequality in self-enforcing ways that either promoted (U.S. and Canada) or limited (much of Latin America) subsequent economic growth.

Can the impact of Russian serfdom and emancipation be understood in a similar way? The economic backwardness of Tsarist Russia has longed been blamed on absent or poorly functioning institutions: weak corporate law (Owen, 2002), the inefficiencies of communal land tenure (Gerschenkron, 1965), and the limited responsiveness of the political system (Nafziger, 2011), just to name a few. Numerous scholars have emphasized the negative implications of serfdom – a coercive system of labor control similar in many ways to American slavery – for Russian economic development during its evolution from the 16th to the 19th century. Possible mechanisms included limitations on the mobility of serf labor, laws against peasants engaging in certain types of economic activity, restrictions on serf property ownership, prohibitions on formal schooling, and deadweight losses implied by different types of seigniorial obligations. In sum, these factors have been viewed as contributing towards the slow pace of agricultural growth and industrial expansion in Russia prior to serf emancipation in 1861.[4]

Furthermore, Gerschenkron (1965), Robinson ([1932] 1972), Lenin (see the quote above), and others argue that manner by which the Russian peasantry was freed may have reinforced or even strengthened many of these constraints. In contrast to African Americans after slave Emancipation, Russian peasants did receive title to land under their control in a complicated and drawn out process. Critically, the land reforms that accompanied emancipation were heterogeneous across European Russia and among different peasant groups, with former serfs receiving relatively bad settlements. This variation in the ways that serfdom ended influenced the subsequent level and distribution of productive factors among the rural population (as we show

[2] The quote is from an essay by Lenin (1911).
[3] By "institution," I mean informal customs, behavioral norms, and culture, as well as formal laws, political entities, and corporate bodies – anything that affects incentives or enforces certain types of economic behavior. See Greif (2006).
[4] Speaking shortly after signing the Treaty of Paris that ended the Crimean War, Tsar Alexander II asserted that, "It is better to abolish serfdom from above than to await the day when it will begin to abolish itself from below" (quoted in Emmons, 1968, p. 41).

below); and it may have also fostered persistent differences in human capital accumulation, market development, and subsequent institutional development across Imperial Russia. Therefore, in considering the possible short and long run implications of serfdom for economic outcomes, it is absolutely vital necessary to document and understand the variation not only in the coercive labor system itself, but also in how the emancipation and land reforms differentially occurred across space and between different groups of peasants.

Unfortunately, although the literature on the origins, workings, and consequences of Russian serfdom is voluminous, relatively little of this scholarship has been explicitly empirical. The dearth of adequate quantitative evidence is especially significant, because, as emphasized by Dennison (2011), Kolchin (1987), and others, the set of arrangements known as "serfdom" varied widely across space and over time. Conditions on even nearby estates were frequently quite different, and the processes of emancipation and land reform took different forms depending on the location, the structure of seigniorial property rights, and characteristics of the local peasant population. Much of what we know about serfdom and the way it ended comes from case studies based on archival documentation for individual estates or small micro-regions, or is read from aggregate statistics. The key contribution of this paper is to present a number of stylized facts describing the geography of serfdom prior to 1861, as well as differences in factor endowments and the distribution of property stemming from emancipation and the accompanying land reforms. Drawing on a new district-level dataset, this constitutes a much richer picture of the variation in serfdom and emancipation across European Russia than has previously been available. These data represent the first stage in the larger empirical project, which is to examine the ways that serfdom and its legacy did or did not matter for Russian economic development prior to the Revolutions of the 20th century.

To frame the issues, the first section of the paper briefly summarizes the evolution of serfdom and provides a framework for why it may have impacted current and subsequent economic development. We then document several aspects of the variation in serfdom just prior to emancipation. First, not all Russian peasants were obligated to private landowners prior to 1861. Privately owned serfs (*krepost'nye liudi*) actually comprised a minority of the peasant population in European Russia by the 1850s, and tax census data allow us to describe the geography of this variation.[5] Second, we establish that there was considerable heterogeneity in the type and level of obligations imposed on serfs. The majority of serfs were liable for some form of labor obligations, often in combination with cash or in-kind payments. We also describe how estates varied over European Russia according to their size and their internal organization. Confirming existing scholarship, but in contrast to American slavery, the median Russian serf resided on estates of well over 100 serfs. Finally, and as a first step towards establishing a causal framework for future research, we examine a simple set of correlates to document what might have driven the variation in serfdom. We find several results consistent with the literature, particularly the concentric relationship with Moscow, but we acknowledge the need for further work to ascertain the precise determinants of this form of institutional variation.

[5] Aproximately 36% of peasant male souls (*dushi* – the primary tax unit) were serfs in 1858, while around 53% resided on state land and were administered by the Ministry of State Domains (Table 1; and Kabuzan, 1971, p. 176). The Tsar's family held the remaining 5% as appanage (*udel'nye*) peasants. Their reform experience fell somewhere between that of the former serfs and the former state peasants.

In the second section of the paper, we explore the post-1861 differences in landholdings between formerly serf and non-serf areas, and between areas where serfdom took different forms. Emancipation began a process of transferring a significantly revised set of property rights (compared to their previous holdings) to the newly freed serfs, but the amount of this "allotment" land and the associated payments required under the "redemption" process varied geographically and depended on initial conditions. Moreover, reforms of the 1860s affected all members of the peasant *soslovie*, or social class, and not just those who were formally obligated to the nobility as serfs. In particular, 1866 statutes endowed the state peasantry with essentially the same land holdings as they had previously held, and we provide evidence that these (greater) allotments carried a lower redemption cost than those of the former serfs well after the 1860s.[6] We also document other dimensions of property endowments established in the wake of emancipation and redemption, including the amount of non-allotment land acquired by peasants, the resulting inequality of land ownership, and the corresponding level of property taxes imposed on landed property. Again, a series of simple econometric exercises help us document the ways that serfdom and its reform process had persistent implications for factor prices and land endowments in the Russian countryside.

The next stage of the broader research project will focus on the empirical relationship between serfdom, land holdings and inequality, and subsequent development outcomes. Given the disruptions of the Soviet experience, our intention is to consider medium-term outcomes or development channels late in the Tsarist period, rather than modern GDP per capita. Obviously, such an empirical analysis faces a significant hurdle: there were surely unobservable reasons why both land inequality and serfdom (and the reforms of the 1860s) varied across space in the ways that they did. In other contexts, Acemoglu et al. (2012), Dell (2010), Nunn (2011), Miller (2009), and others have employed plausibly exogenous sources of variation in slavery (or in the conditions of emancipation) to study the long-run implications for economic development. At this stage of the research, we can only suggest some tentative possibilities in such a direction in the concluding section of this paper, based on our initial examination of the underlying determinants of "serfdom" and "inequality" in the first two sections of the paper.[7]

1: Russian Serfdom: History, Conceptual Framework, and Empirical Evidence

Russian serfdom emerged in the 16th and 17th centuries as a solution to the problem of scarce labor and widely available land. In return for service – military or otherwise – the Tsars and other higher ranked land-owning nobility granted land to favored individuals. Making these grants productive required labor, but the mobility of the peasantry initially made it difficult to ensure a labor force. Thus, a series of decrees slowly circumscribed the mobility of peasants who

[6] Furthermore, several studies have argued that even before 1861, state peasant households held more secure property rights and were able to allocate their labor with less outside interference (Crisp, 1959; Deal, 1978; and Ivanov, 1945). Such differences may have been institutionalized in the reforms of the 1860s.

[7] In the spirit of Bertocchi and Dimico (2012), Nunn (2008b), and Summerhill (2010), we have undertaked a series of simple (and, admittedly, only suggestive) regression "horse races" between various measures of serfdom, inequality, and outcomes. These preliminary quantitative exercises do find spatial differences in several development indicators that can be plausibly linked to variation in serfdom or to property inequality. However, we find little evidence for a broad-based negative development impact of serfdom in the medium-run. Ongoing data collection aims to incorporate arguably exogenous geographic determinants of both serfdom and inequality into this empirical framework.

were resident on such holdings while also making other aspects of their lives increasingly subject to oversight by the class of servitors. In part, this built on a long tradition of Russian debt and hereditary slavery (*rabstvo* or *kholopstvo*).[8] The legal code (*Ulozhenie*) of 1649 capped this process, which was followed over the next century by measures that transformed the servitor population into a full-fledged noble estate with rights and privileges that extended over their peasant population. These steps consolidated serfdom as an institution that would become synonymous with rural Russian society by the 18th century.[9] Therefore, the distribution of serf estates was quite likely driven by the path of Muscovite expansion and the related – and possibly geographically idiosyncratic – process of land allocation to the servitor class.

The rights of serf-owners included various forms of seigniorial rents and obligations, along with control over most aspects of their peasants' lives. This was especially true after Catherine II issued the Charter of the Nobility in 1785, which ended obligatory state service for the nobility and granted them broad authority on their own estates. Seigniorial extractions either took the form of simple cash or in-kind payments, or were demanded as labor on the *demesne*. As we indicate below, in the northern and central provinces around Moscow, poor soil and climate conditions led estate owners to allow many of their serfs to turn to non-agricultural occupations (often off the estate) to generate income and pay their tax and seigniorial obligations in cash or kind. Estate lands in such areas were often granted in their entirety to the serfs to do with as they wished, as long as they paid their *obrok*, or quit rent.[10] As a result, these payments often came to represent a tax on serf labor income from non-agricultural work, rather than some portion of Ricardian land rents. In contrast, the provinces to the south and west, where soil and weather conditions favored commercial agriculture, were characterized by the presence of substantial estate *demesnes*. In this region, serf obligations frequently included labor services for a particular number of days or for certain agricultural tasks, with the assessed amount dictated largely by the level of labor productivity in agriculture. In such areas, most notably described by Steven Hoch in a series of works, the landowner or his appointed manager was much more directly involved in managing the economic activities of his or her serfs.[11] These were the estates underlying Domar's (1970) model of serfdom as a solution to a (agricultural) labor scarcity problem.

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[8] Slaves likely constituted less than 10 percent of the Muscovite population in the early 17th century. Agricultural slaves were converted to serfs by decree in 1679, although this was of little *de facto* importance. During reforms installing a poll-tax system in the early 1720s, Peter the Great transferred any remaining slaves to household serf status (Hellie, 1982).

[9] See Blum (1961), Hellie (1971), and Robinson (1972). Hellie provides a detailed account of the rise of serfdom as the outcome of increasingly expensive military developments.

[10] Many serfs and state peasants in the region engaged in small-scale trading or proto-industrial activities (Bohac, 1989; and Dennison, 2011). Serf-owners frequently granted travel passes that allowed their peasants to migrate for urban or factory-based employment (ibid.; Gorshkov, 2000; Melton, 1987; Rudolph, 1985; and Tugan-Baranovsky, 1907 [1970], Part 1).This could involve wage work in capital-intensive, modern factories founded by serf entrepreneurs themselves. In other cases, serf-owners moved their peasants to work in their own enterprises off the estate (e.g. Bohac, 1989). The Moscow region became widely known for textile production, with peasants often foregoing agriculture entirely to concentrate on home or factory-based spinning and weaving (Vodarksii, 1972). In the Urals, most of the serfs were directly obligated to work in mining and industrial enterprises and received access to some land in exchange.

[11] See Hoch (1986). As popularized in many works of classic Russian literature, this could result in corporal punishments or interference in the personal lives of serfs by their masters.

The strengthening of serfdom in the 18th and 19th centuries was matched by the emergence of the peasant commune as an important institution in rural Russian society.[12] On serf estates, the commune organized agricultural production and managed property granted by the owner. Such coordination occurred under the open-field system of mixed grain and livestock farming that prevailed through the 19th-century Russia (Moon, 1999, pp. 122-126; and Pavlovsky, 1968). At the same time, local administrative and judicial tasks were often informally devolved to the commune and managed by elected communal elders or the assembly of household heads (the *skhod*). Devolution to communal control was also necessitated by substantial landlord absenteeism and the immense size of some estates (Blum, 1977). Authors such as Hoch (1986) have emphasized that even on estates with more direct landlord management, there was a close relationship between communal and seigniorial authorities. The commune came to be responsible for the fulfillment of seigniorial duties and other state obligations that were collectively imposed on the households of the community. This collective responsibility, or *krugovaia poruka*, for external obligations came to be a defining feature of rural Russia well after serfdom ended.[13]

By definition, serfdom entailed constraints on the mobility and the economic decision-making of peasants. Soviet scholars often bent over backwards trying to prove that serfdom was in crisis before 1861 (e.g. Koval'chenko, 1959), but more careful studies employing simple microeconomic theory and some limited empirical sources have found that it likely remained profitable until the very end (Domar and Machina, 1984). In contrast to much received wisdom, the evident mobility of peasants under serfdom suggests that this institutional structure did not prevent engagement in many forms of commerce, artisanal work, or industrial labor. Moreover, evidence presented by Tracy Dennison (2011) suggests that in the absence of much state interference, large estate owners found it profitable to provide private legal structures, limited public goods, and a relatively light hand when it came to internal governance. Relative to areas or villages without such institutional structures (i.e. among the state peasantry – see below), such well-organized estates may have actually seen environments more conducive to economic development. The work by Dennison on an estate from northern Russia contrasts with the relatively pessimistic view of institutional arrangements found by Hoch in the black-earth region he studies. Indeed, the main theme that emerges from the case-study and region-specific historical literature is the exceptional estate-to-estate variation in what serfdom entailed across European Russia.

Privately owned serfs were not the only type of peasants in European Russia by the middle of the 19th century. Several factors contributed to the emergence of a heterogeneous state peasantry (*gosudarstvennye krest'iane*) residing on land formally controlled by the state, rather than private landowners: the tradition of granting land in return for service slowed over the 18th century, leaving many peasants on un-allocated state property; in the 1760s, the state took over all lands

[12] Prior to the 18th century, peasants did live in communities that engaged in some collective management of property and fulfillment of obligations to the state and the nobility. The best descriptions of the commune under serfdom can be found in Aleksandrov (1976), Bartlett, ed. (1990); Dennison, 2011; Hoch, 1986; and Pushkarev, 1976.

[13] The communal form of peasant society was reinforced by the soul tax initiated under Peter the Great in the 1720s and lasting until 1886. This was collectively imposed on an estate's serfs or a state peasant settlement. Revisions of the payment amounts occurred through a series of ten tax censuses, with the last occurring in 1857-58. For more on the tax censuses, or revisions, see Hoch and Augustine (1979).

owned by the Orthodox Church; and continued expansion of the state to the south and southwest opened up new areas for the migration of independent farmers (or run-away serfs).[14] In many provinces, including central ones such as Moscow, state peasant communities existed alongside serf villages and managed land and obligations (tax and land-use payments) communally in much the same manner as the seigniorial peasants did. According to some accounts, the agricultural techniques of the seigniorial and state peasants were remarkably similar, despite some efforts by the Ministry of State Domains to improve the techniques of the state peasants before 1861 (Deal, 1981; and Ivanov, 1945, p. 128).[15] Moreover, although the institutional structures of the two broad groups within the peasantry were distinct, their ethnicities, religious identification, and customary practices tended to be quite similar.

Other evidence suggests that the economic conditions of state peasant villages did differ from those of the serfs before the reforms, with serfs possibly more specialized in agriculture and less able to take advantage of off-estate opportunities.[16] In addition to the state poll tax (the famous soul tax), military recruitment levies, and other local in-kind and labor service obligations, all of which also imposed on serfs, state peasants were liable for rental payments for the land they occupied (*obrochnye podati*). However, when compared to serfs, many authors argue that state peasants faced lower levels of obligations that were more closely tied to the value of their land holdings, they could more easily engage in contracts, and they had stronger traditions of individualized property rights (Crisp, 1976; Deal, 1981; and Ivanov, 1945).[17] Constraints on labor market decisions may have also been lower among the state peasants. By the 1850s, over

[14] The origins of the state peasantry varied across the Empire. In Moscow province, the former state peasants were primarily descendants of serfs who passed to state stewardship when Catherine the Great expropriated the church lands in 1764 (Kabuzan, 1988, p. 76). Descendants of such peasants were known as "economic peasants," although their administration fell under the Ministry of State Domains by the early 19th century. In southern provinces, many state peasants were initially independent soldier-farmers. In more peripheral areas, the state peasants simply resided on land that was never allocated to state servitors. The peasant estate, or *soslovie*, was comprised of serfs, state peasants, court or court peasants (residing on land owned by the Romanov family), foreign colonists, Cossacks, discharged military conscripts, and various specially recognized ethnic nomadic and sedentary populations. Each of these groups (and, indeed, the different types of state peasants) possessed distinct legal rights and fiscal obligations, but in the current version of the paper, we subsume much of the variation in the peasant estate to a simple serf / non-serf breakdown.

[15] The Ministry of State Domains was created in reforms of the 1830s under P. D. Kiselev. A similar overarching administration emerged for the land owned by the Tsar's family (the *udel'* or *appanage*) in the early 19th century.

[16] According to Mironov, serfs had 6-7% higher output per acre than state peasants in the 1850s (1996, p. 324). Deal (1981, p. 111) compares a random sample of serf estates and state peasant villages in Kharkov province and finds that serfs had higher per capita output on their allotment land in the 1850s. However, Dennison (2011) and Nafziger (2012b) note that this was likely driven by the forced "over-allocation" of serf labor to their allotment land.

[17] State peasants were granted the possibility of owning land in their own name far earlier than the seigniorial peasants (1801 versus 1848). They could enter contracts, own and inherit land, and freely engage in non-agricultural work without the approval of seigniorial officials (Blum, 1961, pp. 485-488). Measures throughout the 18th and early 19th century – especially the reforms of Kiselev in the 1830s and 1840s – aimed to regulate the payments required from state peasants and correlate them more closely to land quality and ability to pay (Moon, 2001, pp. 46-47). According to Deal's account of these reforms in Kharkov province in the 1840s and 1850s, this resulted in the equalization of payment obligations between villages, with consideration of differences in net income (1981, pp. 162-163). The absence of any coercive extraction of rents by a private landowner meant that state peasant communities likely faced lower net obligations before 1861 (Ianson, 1881, and Robinson, 1972, p. 90). Finally, the granting of migration passports by the Ministry of State Domains was relatively standardized, and the number increased substantially before 1861 in Moscow province (Ivanov, 1945, p. 108). Conditions of the court peasants likely lay between those facing serfs and state peasants.

90% of state peasant males in Moscow province were involved in some type of non-agricultural activity (Ivanov, 1945, p. 103). This was apparently higher than the percentage of serf males, although there is less quantitative evidence on the pre-1861 allocation of labor by seigniorial peasants.[18] Moreover, specific efforts by the Ministry of State Domains to encourage school investments, grain stores, and new institutions of peasant self-government (formalizing existing communal structures) led to differences in the provision of public goods by the time emancipation (Druzhinin, 1946 and 1958; and Nafziger, 2012b).

Therefore, regions and villages characterized by the greater prevalence or a different form of private serfdom may have seen differences in the level of economic development by 1861. This may have arisen from differences in factor endowments (and the level of associated obligations), the availability of higher returns to on or off-farm labor, the local provision of public goods, or institutional variation. Furthermore, even apart from the direct impact of emancipation and land reform on factor endowments (including land inequality), institutional and other differences may have generated negative effects for economic outcomes that persisted after serfdom ended. In the present paper, we focus on the subsequent variation in factor endowments and related payment burdens, but before embarking on that subject, we undertake a detailed quantitative accounting serfdom across European Russia prior to 1861.

1.1 Quantitative Evidence on Serfdom Prior to Emancipation

[Insert Table 1 about here]

Perhaps surprisingly, exactly where serfdom existed and the form it took are issues that are not well understood empirically. Most of the literature on serfdom relies on legal decrees or qualitative accounts. Soviet scholars were very interested in quantification, but their evidence was often limited to a few estates, small geographic areas, or aggregate figures (e.g. Koval'chenko, 1959; Liashchenko, 1949). Depictions in the western historiography tend to focus on broad provincial or regional comparisons (e.g. Moon, 2001) or consider evidence from case studies (Dennison, 2011; Hoch, 1986). In addition to archival information on individual estates or family holdings, researchers have relied almost exclusively on the ten tax censuses, or revisions, conducted between 1720 and 1860 as the primary source of quantitative data on the extent of serfdom. Here, we draw on the last of these tax censuses and a number of other relatively underutilized sources to provide a brief comparative snapshot of what serfdom looked like at the district level in the late 1850s. Where possible, we also consider dynamic evidence on serfdom in the century leading up to emancipation, although our primary focus is on documenting the institution just prior to 1861.

[Insert Table 2 about here]

[18] Crisp notes that, "The better opportunities for earning and the relatively low rents of the state peasants gave them greater possibilities of accumulating capital" (1976, p. 93). Ivanov (1945) provides qualitative evidence on this point for Moscow province. According to an 1851 newspaper article commenting on Zvenigorod and Dmitrov districts, "grain cultivation is primarily practiced by serfs...[state peasants] primarily live and work as hired labor in factories in cities or have some kind of craft production in the home" (ibid., p. 104).

According to the data collected in the 10th tax revision of 1857-1858 (Tables 1 and 2), the districts of European Russia (in 50 provinces, minus Poland and Finland) contained approximately 22 million serfs out of a population of just over 60 million (approximately 36.4 percent). Roughly 92.5 percent of districts (458 out of 495 with data) contained some serfs, although their share of the total population exceeded 80 percent in only 7 and many districts had a negligible number (Figure 1a). The serf share of the total population was somewhat lower than earlier in the 19th century (approximately 50 percent in 1811), as manumissions, transfers of indebted estates to state ownership, and differential population growth by region all served to reduce the serf population relative to other groups of peasants (Hoch and Augustine, 1979). The differential provincial trends from the second tax census to the tenth are presented in Appendix Table 2. While some more recently settled southern areas saw rising shares of serfs, most of the densely populated central provinces experienced a relative decline in serfdom from the late 18th century onwards.

By the late 1850s, the geographic distribution of serfs was concentrated in a band from Kiev to the upper Volga (Figure 1b).[19] Yet, there was considerable variation in the prevalence of serfs in the general population at the district and the village level (Deal, 1981; and Nafziger, 2012b). For example, the provinces of Kazan on the upper Volga, Kherson on the Black Sea, and Kostroma to the north of Moscow saw intra-provincial variation of forty percent or more in the shares of the population who were serfs.

[Insert Figure 1 about here]

In documenting the variation in serfdom, we draw upon a number of sources other than the tax censuses. According to information reported by provincial committees of the nobility to the central Editorial Commission preparing the emancipation reforms in 1858-60, the share of serfs (male souls) obligated for quit-rents alone was 25.7 percent (Tables 1 and 2).[20] The rest were required to perform at least some form of labor services, which may have included working in estate-owned enterprises (including natural resource extraction in the Urals) or various types of agricultural work on the *demesne*, with or without the provision of their own draft power as well. In a separate category, the share of serfs engaged in domestic or craft work on the estate – a group known as "household" serfs, in contrast to "field" or "peasant" serfs – comprised around 6.7 percent of the total serf population. This category of serfs received no access to land in the emancipation reforms. Thus, well over 50 percent of serfs remained obligated for some amount of labor directly on the *demesne* or in enterprises run by the serf owner, such as sugar processing on Ukrainian estates. Those serfs that paid quit-rent in some form were liable for seigniorial obligations, at least according to the data reported by the nobility themselves, of over 25 rubles per *tiagla*, a labor unit typically defined as a husband and wife team with horse or ox (Table 2). As Figure 2 indicates, *obrok*-only obligations were more common among the serfs of the agriculturally less productive provinces of the north and central regions.

[19] The map in Figure 1b represents one of the first geo-referenced district-level maps of European Russia from the late Tsarist era. The underlying shape files are available upon request.

[20] To our knowledge, these data (reported in Skebnitskii, ed., 1865/66) have never been systematically explored in Western or non-Soviet scholarship. There was quite possibly some reporting bias in these data, as it may have been in the nobility's interests to overstate their level of *obrok*, as it influenced their compensation in the emancipation's land reforms (Moon, 1999, p. 76). Emmons (1968) provides a useful account of the Editorial Commission's work.

[Insert Figure 2 about here]

It worth considering the extent to which these seigniorial obligation levels were large or growing, especially in comparison to the non-serf peasantry's tax and land payments. According to Koval'chenko (1959) and a host of other Soviet scholars, the nominal level of burdens was increasing in the early 19th century, even as incomes themselves were rising slowly. The result was a relatively steady soul tax/*obrok* burden of 20-30 percent of serf household income.[21] However, the available evidence appears clear that serf quit rent payments far exceeded those paid by the state peasantry by the late 1850s. Druzhinin (1958, vol. 2, p. 133) notes that serf *obrok* obligations per male were 3-6 times what was paid by state peasants in the same provinces (roughly 8 versus 2 silver rubles) in the late 1850s. Moreover, following the reforms of the state peasantry in the 1840s and 1850s, there was much less heterogeneity in payment amounts among state peasants within a province.[22] Druzhinin (ibid., p. 146) also finds that *obrok* and soul tax payments comprised between 7 (Pskov) and 20 (Kursk) percent of mean household income among the state peasantry. More work remains to be done on the documenting the level, trend, and variation in serf obligations prior to emancipation, especially in real terms, but it appears likely that state peasants faced lower levels of extraction prior to 1861, all things equal.

In addition to the summary data compiled by the Editorial Commission, most of the provincial committees of the nobility compiled self-reported estate-level information for the largest holdings in each district.[23] These data may surely suffer from some selection and reporting biases, including the underreporting of estate size in an attempt to avoid property losses to the soon-to-be emancipated serfs. With this concern in mind, these data do suggest that roughly 65 percent of serfs resided on such large estates, where the average estate size was approximately 334 male souls (Table 2). As is well known, this large mean estate size represents one significant difference between Russian serfdom and American slavery (Kolchin, 1987). Although the data coverage is incomplete (several provinces are missing), estate size appears to be relatively evenly distributed across provinces, with a slight west to east gradient (Figure 3). The share of serfs on large estates who were on quit-rent only (here, measured in terms of *tiagla*), or who worked in the owner's household, were only slightly less than across all serf estates.

[Insert Figure 3 about here]

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[21] This range reflects corrections made to the (higher) original estimates of Koval'chenko and Milov (1966) by Ryndziunskii (1966) and others. The latter writer and other scholars also draw on estate level documents documenting local trends in *obrok*. Although Soviet schaolrs also concluded that labor obligations were rising on *barshchina* estates, we are aware of no quantitative information in support of this possibility.

[22] Druzhinin compiled his state peasant payment (*obrok*) information from yearly accounts kept by the Ministry of State Domains. He compares these numbers to the same data on serf *obrok* levels that we examine in Table 2. Our estimate of 25 rubles per *tiaglo* is broadly consistent with his 7-11 rubles per male soul once the additional capital often provided by serfs is taken into account. Elsewhere in his magisterial work on the reforms of the state peasantry, Druzhinin (1958, p. 146) notes that *obrok* and soul tax payments comprised between 7 (Pskov) and 20 (Kursk) percent of household income in the late 1850s.

[23] Information was supposed to be collected on all estates with more than 100 male souls, but our work with the published returns shows some smaller estates were included. These estates were included in the summary statistics of Table 2, as the exact criteria for their inclusion in the published source was not indicated. The large estate data was not reported for several provinces noted under Table 2.

Although a number of scholars have remarked on the especially poor conditions faced by residents on very small serf estates, the available district-level data provide little information on these serfs.[24] Provincial-level data from the 10th tax census, published by the Ministry of Internal Affairs, show that approximately 80 percent of serf owners owned estates of less than 100 male serfs, but such estates held less than 20 percent of serfs. The relative importance of such small estates varied across European Russia: they held less than 5 percent of serfs in Kiev, Perm, and Podol'sk, but over 30 percent in high serf provinces such as Novgorod, Pskov, and Poltava.[25]

Finally, the summary data reported to the Editorial Commission also included limited information on the amount of land allotted to serfs on estates, as well as comparable information on mean holdings of peasants obligated to the state or directly to the Tsar's family. Although 458 districts had some amount of serfdom, serfs received substantive allotments (greater than 0.1 *desiatina*, or 2.7 acres) in only 387 of the 424 that provided these data, with a mean allotment of 3.33 *desiatina* per soul. In the reporting districts, serf estates possessed approximately 13.8 *desiatina* per soul in total. Therefore, on average, serf allotments were less than 1/3 of estate land prior to emancipation. Moreover, the average serf allotment was significantly smaller than the amount of land available to either the court or state peasants, although a large number of the latter group resided in more sparsely settled northern and eastern provinces. This gap in the relative size of serf and non-serf landholdings persisted well after serfdom – the bottom of Table 2 shows this utilizing land data from 1905. We return to this difference below.

1.2 Exploring the Variation in Serfdom [Preliminary]

In laying the groundwork for an analysis of the association between serfdom and various indicators of economic development, we must first understand the factors behind the distribution of serfs and the variation in the different types of serf estates. A number of theoretical, historical, and geographic explanations have been offered for why serfdom existed in the form it did, in the places it did. We investigate a few of these in this section, but data limitations – particularly regarding underlying geo-climatic factors – constrain our current efforts.

In reflecting upon the Russian experience, Domar (1970) famously treated serfdom as the product of a high land-labor ratio and the state's willingness to impose mobility restrictions on the peasant labor force to support the landed elite. Following earlier historians who had made similar arguments, Domar emphasized that in the context of an elastic supply of land, the Russian state's policies allowed the emerging nobility to extract the shadow (labor) scarcity rents from the land they owned. A similar logic forms the basis of more complicated dynamic models of slavery in land abundant societies, such as in Lagerlof (2009) or Fenske (2010). One implication many have drawn from Domar's model is that coercive labor systems may be more prominent in especially land-rich/labor-poor societies. This is not the only reason Domar cites for the emergence of serfdom in Russia, but it is one we can at least begin to examine with the data at hand.

[24] In her study of a quit-rent estate in Iaroslavl' province, Dennison (2011) acknowledges that findings of a somewhat supportive institutional environment for economic development may be driven by the large size of the estate, especially when it came to an administrative structure. On the issues facing serfs on small estates, see Robinson (1932 [1972]).

[25] We take these data from Troinitskii (1858). "High Serf" provinces are those where serfs more than 30 percent of the population.

[Insert Figure 4 about here]

Relying on population data from tax records in the early 1860s, Figure 4 plots the district-level relationship between population density and the portion of the population who were serfs in the late 1850s (a similar picture emerges if the urban population is excluded). It shows a positive relationship, suggesting little support for a simplistic view of Domar's basic point about the serfdom taking hold in especially *land-abundant* areas.[26] Of course, it may very well be that those districts with more productive land and, hence, higher population densities, were those where relatively more land was *endogenously* granted to servitors during the consolidation of serfdom. It is also important to keep in mind that many serfs were not engaged in agricultural production as a primary occupation by the middle of the 19th century. Figure 5 plots the relationship between the share of serfs exclusively on quit-rents and both population density and the overall population share of serfs. The relationship is only marginally and negatively related to population density, which is again inconsistent with a simple version of Domar's interpretation of agricultural serfdom. Serf-owners of the mid-19th century were perfectly willing to let their serfs work in non-agricultural trades as long as their obligations were fulfilled.[27]

[Insert Figure 5 about here]

Table 3 presents simple OLS regression estimates that extend the ocular regressions of Figures 4 and 5.[28] In the first three columns, the dependent variable is the share of the population that was serf in 1858; in the last four columns, it is the share of the serf population on *obrok* only. To evaluate the central component of Domar's hypothesis, we include population density in 1858. Although not significant in either basic specification, the coefficient is negative and strongly statistically significant in the 2nd and 3rd models with province fixed effects. Thus, once fixed geographic differences are at least partly taken into account, we find some limited support for a simplistic version of Domar's model.

[Insert Table 3 about here]

The historiography of serfdom connects its evolution to the process of political and military expansion of Muscovy from the 15th century onwards. In return for military and other forms of state service (and to help fund their ability to provide service at all), Tsars granted populated land to mounted cavalry and artillerymen (Hellie, 1971). The tightening restrictions on the mobility and rights of the peasant population over the subsequent centuries (culminating with the *Ulozhenie* of 1649) came in response to demands from this servitor class as it transitioned into a

[26] It does not matter how we specify land abundance; the picture remains the same.

[27] Dennison (2011) notes that serfs on the estate (Voshchashnikovo) were forced to farm their relatively unproductive land in Iaroslavl province or suffer fines. It is unclear how common such a rule was, but one side benefit from the estate-owner's perspective was some assurance about the subsistence – and, therefore, payment ability – of their serfs.

[28] The regressions are all simple linear models with or without province fixed effects and with robust and clustered by province standard errors. Districts with less than 1% serf population are dropped from the analysis. Note that the pair-wise correlations among these variables are provided below Table 4, along with an explanatory note regarding how they were constructed. The latitude and longitude variables and the distance from Moscow were all individually correlated with the two outcome variables.

landowning gentry. Therefore, the role of labor scarcity, while possibly important to serfdom's consolidation and persistence, may have had only a supplementary role in explaining exactly where the system existed or what form it took. Supporting the notion that serfdom in the Russian case was an outcome of Muscovite policy as the state expanded, columns 1 and 2 show that relatively less of the population were serfs the further one went from Moscow (even *within* provinces). Land was more likely to be granted to the nobility the closer it was to Moscow, with more peripheral areas being relatively undesirable or only incorporated into the Empire late in the 18th century (and relatively sparsely populated before that).[29] Such a distance effect does not exist for the quit-rent share models when province fixed effects are added.

Obviously, the value of land, the productivity of the immobile serfs upon it, and, perhaps, the direction of Muscovite expansion were related to local agro-climatic conditions. As one slightly richer way to control for geography, models 3, 6, and 7 substitute the latitude and longitude for the distance to Moscow variable. The size and significance on the latitude variable again suggests that serfdom was more prominent in the Russian heartland in the north (where, as model 7 suggests, *obrok* was more common) and less evident in the newly settled, more agriculturally productive areas to the south. Moving west to east in a line, there were few differences in the prevalence or nature of serfdom, especially within provinces.

Unfortunately, other district-level geographic or socio-economic information for the pre-1861 era is very scarce, and this limits the identification of exogenous sources of variation in serfdom. In future versions of Table 3, we hope to expand on our controls for local geographic conditions by employing GIS software to match modern soil and climatic information to the district-level boundaries from the 19th century. After 1861, considerably more data are available, but using them to *explain* (causally) the variation in serfdom is problematic for a number of reasons, including the basic timing issue. However, there may be interesting possibilities in this direction, as suggested by the result on the mean oat yields variable included in model 7. Although this variable reflects conditions from the 1880s and 1890s, it likely does proxy for overall land productivity, as investments that would have dramatically improved soil quality or new agricultural practices were likely limited prior to 1900, especially when comparing across districts within a province. That this variable was negatively related to the share of serfs on quit-rent is consistent with the logic that serf owners in such districts were trying to extract payment, rather than labor, obligations to take advantage of the relatively better labor market opportunities outside of agricultural production on the estate.

One particularly intriguing possibility for an exogenous source of variation in the extent of serfdom lies in the distribution of monastic properties across European Russia. In 1764, Catherine the Great issued an edict transferring monastic land *and the resident monastic serf population* to state control. Prior to this date, peasants residing on monastic land were subject to many of the same constraints as privately owned serfs. Indeed, the professed reason for the reform in the decree was that the state was concerned about the especially exploitative conditions faced by the monastic peasants (cited in Zakharova, 1982). The result of the reform was the

[29] Some large landowners did move serfs from the central provinces to newly acquired steppe estates in the late 18th and early 19th centuries. Note that the inclusion of provincial fixed effects partially picks up differences in the timing of a region's incorporation into the Empire. In future versions, we hope to utilize historical waterways as another control for the direction of Muscovy and serfdom's expansion.

transfer of approximately 2 million serfs to state control. If one assumes that the original establishment of monasteries roughly paralleled the granting of populated and for state service (or was at least correlated with the unobservable determinants of the latter), than the geographic of monastic expropriation may be interpreted as a plausibly exogenous source of variation in the presence of state peasants, who comprised the bulk of non-serf peasants by the 1850s.[30]

[Insert Table 4 about here]

Table 4 explores this possibility using what is admittedly a poor proxy for the distribution of expropriated monastic land – the number of monasteries in each district per that ceased to function as independent institutions prior to 1764 (per 10,000 people in 1860).[31] We are currently collecting information about the number, location, and characteristics of the monasteries actually affected by the original decree (and subsequent ones) from the same source and others. If the location of these closed monasteries (which were generally consolidated into larger complexes) was correlated with the number actually expropriated (and, presumably, the number of peasants affected), then this proxy may still hold some validity as an explanatory factor behind the variation in serfdom's prevalence.[32] Indeed, if the numbers in Table 4 are to be believed, that is exactly what we find: the number of monasteries closed prior to 1764 per 10,000 people was strongly (in the economic and statistical sense) *negatively* related to the prevalence of serfdom in the late 1850s. The F-statistic on the monastic failure variable is 10 in the serf share regression. Perhaps tellingly, the geographic distribution of these monasteries was unrelated to the share of serfs on *obrok* only, which tended to be higher in northern and less agricultural provinces. This lends some plausibility to the identifying assumptions underlying this approach, in that it implies a wide (geographic) variation in where such monasteries were located. Overall, we are hopeful that additional research into the empirical evidence on this or other quasi-experiments will proffer even more plausibly exogenous determinants of the distribution and characteristics of Russian serfdom.

2: Emancipation, Redemption, Peasant Factor Endowments, and Inequality

Alexander II's manifesto of February 19, 1861 initiated emancipation of the serfs and began a sequence of complimentary rural reforms. These measures not only granted new legal freedoms

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[30] Technically, the former monastic serfs were re-labeled "economic peasants" until the Kiselev reforms completely integrated them with the rest of the state peasantry. Zakharova (1982) also notes that the secularization was also driven by state demands for new revenue sources and pressures from local nobility aiming to purchases the land. She provides only anecdotal evidence of the latter possibility. The 1764 decree secularized monastic lands in Siberia and the central provinces of Russia, with later decrees in the 1780s doing iikewise for the Western provinces. However, as noted by Zinchenko (1985), the Western provinces exhibited quite extensive property holdings among different religious entities well into the 19th century, with a series of decrees in the 1840s eventually resulting in their secularization as part of the broader state peasant reforms.

[31] Utilizing just the number of monasteries led to virtually identical results, as does the employment of different population denominators. The district-level counts of such monasteries were compiled from the lists in Zverinskii (2005 [1897]). The specifications in Table 4 include both latitude and distance to Moscow as controls; the results are unchanged if either or both are dropped.

[32] An immediate counterargument would be that the closing of a monastery was possibily related to economic conditions that would have made private estate ownership unattractive as well. In this sense, the variable is proxying for unobservables, rather than acting as a "treatment" in the natural experiment sense. Alternatively, the existence of monasteries might have reduced the possibility of land being granted to state servitors in the first place.

to the rural population, but they also transferred formal land rights to the peasantry in a mortgage-like process referred to as "redemption."[33] In comparison to other cases of rural reform in 19th-century Europe or slave emancipation in the Americas, Russian peasants received substantial land rights, albeit generally in the form of communal allotments with associated collective liabilities. Rather than simply expropriating the peasants or the landlords, the state constructed the reforms to include a series of steps that slowly transferred land rights to the peasants while (partially) compensating the nobility for their losses. Financing for the transfer was generally provided by the newly reconstituted state bank, with peasants repaying this mortgage-like credit over an extended period that was only projected to conclude in the 1910s. There was substantial heterogeneity built into this process: the price and amount of land allowed to each community was locally differentiated; leeway was left to bargaining between peasants and landowners; and different reforms were initiated for very small estates, for peasants that resided on state or Tsar-owned land, and for serfs employed as domestics. Overall, these reforms led to hopes that the Russian economy would begin to modernize and catch up with the industrializing nations of Western Europe. Almost immediately, however, contemporaries identified a growing economic crisis in the countryside and attributed this to particular features of the emancipation reforms (e.g. *Doklad*, 1873). The debate over the economic effects of these reforms continues today, although empirical work on this topic remains quite limited.[34]

2.1 Serf Emancipation and Redemption: The Nuts and Bolts of Institutional Change

As a first step, the Emancipation Statutes – the Main statutes and subsequent legislation – called for the formulation of *ustavnye gramoty*, or regulatory charters, between the former serf communities and their previous landlords. These charters were to be completed by 1863, with hundreds of newly named *mirovye posredniki* (peace mediators) aiding in their writing and ratification (Easley, 2008; Tolstoy famously worked as a mediator). Based on rules laid out in Local Statutes, the charters translated the previous rights and obligations of the serfs into new collective land endowments and sets of labor duties or cash payments. The number of obligated souls (*dushi* – a tax unit roughly equivalent to one working-age male) was set on the basis of the tax census of 1857-58.[35] If the amount of land per soul (a soul "allotment," or *nadel*) exceeded the local maximum norm as defined in the Local Statute, the excess could be "cut-off" and

[33] Emancipation redefined the peasantry's legal status by allowing them to freely enter into contracts and ending the nobility's control over local justice. The General Statute and four Local Statutes governed this process. The General Emancipation Statute was issued as PSZ, Ser. 2, No. 36657. The four Local Statutes were Nos. 36662-36665 (No. 36662 pertains to the Greater Russian provinces that are the focus here). The Main Redemption Statute was issued as PSZ, Ser. 2, No. 36659. Emancipation and Redemption were part of a sequence of measures known collectively as the *Velikii reformy*, or Great Reforms, which also included changes in the judicial system, the military, local administration, and the state's financial organization (Eklof et al., 1994; and Zakharova, 2005).

[34] According to Alexander Gerschenkron (1965), the strong collective liability of households in the newly formalized commune effectively tied labor to the land and restricted the flow of resources into industry. Soviet scholars emphasized that the reforms fixed land endowments too low and set their "price" too high, which led directly to growing poverty in the countryside and rural "proletariatization" (e.g. Khromov, 1967). More recently, some scholars have begun to question whether the reforms had much of an impact at all. Hoch (2004 and 2010), Gatrell (1994), Mironov (1999), and others argue the institutional constraints of the commune were not enforced, and that the land settlements did not significantly change the amount or the price of peasant land-holdings.

[35] There were allowances for community members to opt out of the settlements at this point, but few appear to have done so. Those serfs who previously served as domestic servants, rather than in the fields, were generally excluded from the settlements.

retained by the landlord. If soul allotments fell below one-third of this maximum norm, land was to be added to the new endowment to top it up.[36] This maximum allotment norm corresponded to either an amount of labor (in days per year) or a fixed payment.[37]At a minimum, landlords had the right to keep at least one-third of their land, and until 1870 they could reduce peasant allotments to one-third of the maximum norm at will. These rules pertained only to the arable land on the serf estate. Distinct conditions held for garden plots (passed entirely to the former serfs without charge) and for other types of land. Significantly, the former serf-owner kept all claims to forests and meadows, which were vital inputs into livestock production. Even in the case of arable land, the landlords had the right to pick and choose the specific property they retained as long as the amount available to the peasants followed the statutes.

By the end of 1864, almost all of the regulatory charters were signed by both parties and communities entered into "temporary obligations."[38] During this stage, the households assigned to a commune were collectively liable for the revised cash or labor obligations outlined by the charters. Households could only exit with the unanimous approval of the rest of the members. Those wishing to leave had to give up all rights to a share of the commune's land, and the commune had to agree to take up their outstanding debts and shares of obligations.

Temporary obligations were intended to last until the financial arrangements were made to legally transfer the land to the peasant commune. This involved the formulation of a *vykupnaia sdelka*, or a redemption deal. These deals, which came to resemble mortgage transactions, documented the boundaries and value of the land to be formally transferred. The yearly payments (including the monetary equivalent of any labor services) to former serf-owners under temporary obligations were capitalized at a 6% interest rate to establish the aggregate redemption value of the collective allotment to be transferred.[39] According to the Redemption Statutes, deals could be initiated through mutual agreement between the community and the former serf-owner (requiring a 2/3 vote in the communal assembly) or, more commonly, at the demand of the former seignior.[40] As a result of this tension, the process of formulating these redemption deals was drawn out, and a substantial number of communities were still engaged in temporary obligations in the late 1870s.[41] District-level information on land ownership, collected in 1877,

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[36] For example, the 13 districts of Moscow province were split into three regions with maximum allotments defined as 3, 3.25, or 3.5 *desiatiny* per soul (1 *desiatina* = 2.7 acres). The 1/3 rule defining minimal allotments differed slightly in peripheral areas.

[37] For example, in Moscow province, obligations were capped at 40 days of labor or 10 rubles per soul. It was possible for villages to accept so-called "gift allotments" (*darstvennye nadely*) of one quarter of the maximum norm, free of any obligations. There were very few of these villages in Moscow province, but they were significant elsewhere (Burdina, 1996).

[38] Prior to the signing of the charters, former serfs existed under their previous seigniorial arrangements, subject to some limitations. After passing approval of the local authorities, charters could be mutually agreed to (and signed by the peasants) or forced through by the seignior at a cost in terms of lost compensation.

[39] This was the case for allotments set at the maximum norm from the Local Emancipation Statutes. For allotments smaller than the maximum, the redemption valuation fell less than proportionally, so that the first *desiatina* of allotment per soul corresponded to one half of the (maximum) yearly payment, the second to a third, and so on.

[40] By 1883, less than 14% of ratified redemption deals in Moscow province were entered into in this way. They were prominent in more agricultural areas because landlords often received supplementary labor as part of these settlements (Zaionchkovskii, 1958, especially p. 363). Some deals were also initiated on the insistence of the credit institution to which the estate was indebted.

[41] By 1876, over 16% of the communities in Moscow province with regulatory charters had not completed a redemption deal with their former seigniors (*Otmena*, 1950, p. 286; and Zaionchkovskii, 1958, p. 363).

helpfully divided former serfs into those still under temporary obligations and those who had entered into redemption (Russia, Tsentral'nyi, 1881). According to these data, roughly 80 percent of former serfs (74 percent of former serf communes) entered redemption by 1877. This "pace" of redemption varied widely across European Russia, from 100 percent in many Western provinces (where an immediate transition was apparently enforced under the initial redemption statutes) to less than 55 percent in central provinces like Nizhnii Novgorod and Orel. In the early 1880s, the state mandated that all serfs in temporary obligations transition immediately to redemption.

Regardless of whether redemption deals were mutually agreed upon or not, when an agreement was reached the newly reconstituted State Bank typically financed the transfer through 49-year loans made to the communes. From the former serf owner's perspective, the amount they finally received depended on whether or not the deal was mutual and on the amount of existing debt owed by the estate (Gerschenkron, 1965; and Zaionchkovskii, 1960).[42] In aggregate, the total value of redemption loans made to the peasantry amounted to over 860 million nominal rubles, which was roughly one third of Russian national income in 1861 (Lositskii, 1906, p.39). This corresponded to approximately 26.8 rubles per redeemed *desiatina* (about 10 rubles per acre) or 95 rubles per male former serf liable for redemption, at a time when mean per capita incomes were likely less than 50 rubles. Out of this aggregate liability, at least 320 million rubles (37 percent) were deducted from what former estate owners received due to outstanding mortgage debt to various financial institutions (ibid, p. 44).

A key feature of the redemption program was that the commune was collectively responsible for making payments on the outstanding redemption debt. To enforce household contributions under this joint liability, the communal assembly was granted legal authority over the immovable property and labor allocation decisions of those in arrears (Burds, 1998; and Gerschenkron, 1965). The statutes stated that renewals of passports for work outside the village were only possible if arrears were paid off. If a commune failed to make one of the twice-yearly redemption payments, local state officials could sell assets or punish communal officers. After the community began redemption, households could only legally alienate their share of communal land by paying off their portion of the loan in its entirety. These *de jure* restrictions lasted into the 20th century and have led many historians – most prominently Alexander Gerschenkron – to see the emancipation and redemption reforms as re-imposing many of the same constraints on mobility as existed under serfdom. In this interpretation, these restrictions lowered the supply of labor into industry, forced manufacturing to be overly capital-intensive,

[42] If the landlord chose to force redemption, the state would only finance 80% of the land's redemption value (75% if the redemption allotment was smaller than stated on the regulatory charters). Existing estate debt was subtracted from this percentage, and from the remaining 20% if necessary. This latter portion of the redemption value was to be forgiven entirely if the deal was carried out against the peasants' wishes. The state-financed portions of the redemption value was paid to the former serf-owners in 5% State Bank notes and "redemption certificates," which were non-circulating securities intended for eventual conversion to bank notes. Communities paid their liabilities to the State Bank in the form of yearly redemption payments equal to 6% of the loan. This included the 5% interest payments, 0.5% for a reserve fund, and 0.5% on the principle. There were numerous variations in these formulations, depending on the exact nature of the land being redeemed and whether the settlement was mutual.

and slowed industrialization, thereby generating a "considerable obstacle" for economic growth that lasted until the Stolypin reforms of the 1900s (1962, p. 121).[43]

Although not denying the possible institutional rigidities imposed by the reforms, Soviet and other scholars emphasized that the first-order effects on the economic conditions of the former serfs stemmed more from their substantially worsened property endowments after emancipation.[44] This literature emphasized how land "cut-offs" from peasant holdings under the Local Statutes often reached significant levels, even on top of the already relatively small land holdings granted under serfdom. According to studies of land charters, the former serfs of Simbirsk province lost over 30% of the land they previously utilized (Kanatov, 1964). In Moscow province, they lost 14.2% of their land (Zaionchkovskii, 1958, p. 182). This change in endowments may have forced many former serfs into exploitative rental contracts, whereby communes and households rented land from their former landlords for cash payments (or labor services) that exceeded the agricultural value of the property (Anfimov, 1980; and Filippova, 1959, p. 378).

As discussed above, obligation levels on many serf estates were likely set relatively high to begin with. Before emancipation, seigniorial obligations were not exclusively based on the productivity of the land but were extracted from the total income of serf labor in both agricultural and non-agricultural activities. As a result, post-1861 redemption payments in provinces such as Moscow, where seasonal non-agricultural employment was prevalent before emancipation, probably continued to exceed the agricultural (rental) value of the land (Hourwich, 1891; and Ianson, 1881).[45] Moreover, according to some accounts, the loss in allotment land was matched by a rise in its "price" under redemption. Considering data from 9 of the 13 districts of Moscow province, Boris Litvak found that average payments per soul decreased from 9.36 to 8.44 rubles, while the average per *desiatina* left to the former serfs increased by 8.3%.[46] Soviet scholars went on to argue that these higher cash demands caused previously autarkic agricultural households to look off the farm for income sources to pay their obligations, thereby leading to a "proletariatization" of the countryside.[47]

However, recent research by Sergei Kashchenko and his colleagues on the land charters from several northwestern provinces shows that after emancipation, the distributions of land and obligations (for quit-rent estates only) narrowed around the norms proscribed in the Emancipation Statutes, with little change in the median size of land holdings or overall payment levels (Degtiarev et al., 1989; and Kashchenko, 1996 and 2002). Based on these findings and his own research in agricultural Tambov province, Hoch (2004 and 2010) concludes that the charter

[43] In other work, we establish that the *de jure* communal restrictions created under the reform process often had little effect in practice (Nafziger, 2010).
[44] The influential Soviet scholar P. G. Ryndziunskii (1983, pp. 99-100) emphasized the restrictive role of the commune when it came to the issuance of passports for migration outside the village.
[45] Although Domar himself pointed out numerous problems with these attempts to value land, but he still asserted that peasants probably were overcharged for the property they received (1989, p. 437).
[46] These numbers are taken from Zainchkovskii's (1958, pp. 182-191) summary of Litvak's dissertation research, which was based on the regulatory charters currently archived in the Central Historical Archive of Moscow. They relate to the 70% of the serf estates in Moscow province that utilized quit-rents rather than labor service.
[47] "The emancipation reform...strengthened outwork and forced land rentals" (Filippova, 1959, p. 390). Zakharova argues that the high obligation levels installed in the settlements "hindered the development of the peasant economy" (2005, pp. 159-160).

and redemption deals did not dramatically affect the factor endowments of former serfs, nor did they introduce stronger institutional restrictions on labor mobility and economic development.[48] Although our results are only preliminary at this stage, our analysis of new district-level data suggest that the reforms did result in significant and persistent differences in the land endowments (and their price) between the former serfs and other types of peasants.

2.2 What about the Non-Seigniorial Peasants?

Peasants residing on privately owned land were not the only ones affected by reform in the 1860s. Serf emancipation was followed by similar acts for the former appanage and state peasants (we focus on the latter here).[49] Under an 1866 measure, the state initiated a process to fully document the holdings of the state peasants, with land allotments defined collectively at the commune-level and described in "ownership notes" (*vladennye zapiski*). These were compiled in a similar manner to the regulatory charters of the former serfs, but they were based on officially conducted cadastres of state property in the 1840s and 1850s, rather than any mediated bargaining process at the estate level.[50] As a result, these settlements typically granted state peasant communes the land that they currently held.[51] In return for this property, communities were made collectively liable for 20 years of payments (*obrochnye podati*) that corresponded to their current land rental obligations to the state. Initially, these communal endowments did not entail full ownership rights, as the property was intended for the "perpetual use" of the communities (Zaionchkovskii, 1960, p. 274). However, after legislation in 1886, these payments were converted into redemption obligations, and the former state peasant communities gained the same property rights that the former serfs held over redemption land (PSZ, Ser. 3, No. 3807).

Limited evidence on the ownership notes and final land holdings does suggest that the state peasants experienced some changes in their land endowments during their reform process. State peasants in Moscow province lost some arable land and access rights to a substantial amount of forested area (Druzhinin, 1978, p. 108). In Simbirsk, state peasants lost 14.8% of their land, although this was less than half of the percentage lost by the former serfs (Kanatov, 1964). Even with these losses, the final relationship of land to obligation levels was likely more favorable than that faced by the former serfs, a finding supported in Table 2. It also appears that the total

[48] Similarly, Gatrell (1994) and Mironov (1985 and 1996) assert that the statutes really just continued old limitations on mobility and development under a new institutional guise.

[49] The court peasant reform was legislated in PSZ (Ser. 2, No. 39792), while the state peasant statutes were Nos. 43888 and 44590. The court peasant reform followed a middle path between those experienced by the former serfs and state peasants. Immediately after serf emancipation, the administrations of the court and state peasants were integrated with the new system of local government based on the *sel'skie obshchestva*, which was the official form of the peasant commune that received land rights under the former serf redemption process (PSZ, Ser. 2, No. 42899).

[50] By the end of 1868 all the state peasant villages in Moscow province received ownership notes (Zaionchkovskii, 1960, p. 278). The mandated transfer of small serf estates (less than 20 souls) from private ownership to state stewardship in the 1860s and 1870s slowed the state peasant reform process. Moreover, the ownership notes were supposed to be presented to communal assemblies so that any outstanding complaints could be registered.

[51] An exception was any forested land, which reverted to state control. If the borders of their community's land endowment were not well documented – often the case in peripheral areas – state peasants were to receive no more than 15 *desiatina* per male soul (8 in more populated areas). Furthermore, the Kiselev reforms in the 1840s had already formally established the communal basis for the land rights and collective obligations of state peasant villages (Adams, 1985; and Ivanov, 1945). As a result, the land settlements may have had little impact on the *de jure* and the *de facto* institutional structure of the state peasant villages.

obligations (including various property-based state and local tax assessments) of the state peasantry were substantially lower than the payments made by the former serfs and were very close to what they paid before the reforms (Ianson, 1881; and Ivanov, 1945, pp. 112-121).[52]

Therefore, as a result of the land settlement process, serfs may have lost more land and remained responsible for greater obligations than other types of peasants. As we outlined in Section 1, other aspects of the economic and institutional conditions of the state peasants quite possibly those of the serfs before the reforms, and these may have translated into better outcomes afterwards.[53] Some of the differences between these two types of villages – endowments and obligation levels – are measureable, while others – e.g. the amount of communal restrictions – are unobservable. State policies increasingly treated the various types of peasants in the same way. Statutes in 1886 and 1893 reinforced state and communal control over inheritance practices, land allocation, and the possibility of household exit from the burdens of redemption for both state peasants and former serfs.[54] As a result, Gerschenkron and others argue that the two types of peasants really faced similar institutional constraints through the communal structure of land rights and collective obligations, at least after 1866.[55] In addition, a number of reforms resulted in more equal obligation levels. Measures in the 1880s and 1890s reduced reduce former serf redemption payments and brought them more in line with those of the state peasants by 1900.[56] Overall, to begin differentiating the possible channels by which serfdom may have generated persistent effects on the Russian economy after 1861, it is necessary to quantify the level and inequality of endowments that emancipation and the various land reforms generated.

2.3 The Endowment Implications of Serfdom and the Land Settlement Process

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[52] Hourwich notes that for Riazan province, just to the south of Moscow, the effective taxation rate from redemption and other payments was higher for former serfs than for state peasants (1892, pp. 54-55). Deal (1981) finds similar differences between state peasants and serfs in pre-reform Khar'kov province.

[53] The governor of Perm province in the 1830s, M.M. Speranskii, noted that every serf wished to become a state peasant (cited in Crisp, 1976, p. 76).

[54] See PSZ, 3rd Ser., Nos. 5578, 9754, and 10151. The latter legislation made an individual household's redemption of their portion of the outstanding loan subject to the approval of a two-thirds majority of the communal assembly. It also forbade any sales of allotment land to non-peasants.

[55] In Gerschenkron's (1965) interpretation, communal restrictions on peasant mobility only eased after 1900. Collective responsibility for taxes and land payments was formally ended in 1903. Redemption payment arrears were forgiven after 1905. Administrative and financial measures were passed that made it easier for households to consolidate their land and exit the commune. These Stolypin reforms were intended to improve rural conditions by abrogating many aspects of the institutional regime set up in the 1860s. However, the commune survived the Bolshevik Revolution and grew in relevance with the collective seizures of land from the former nobility. Only the establishment of collective farms in the late 1920s and 1930s formally ended the institution of the land commune, although these new units did retain elements of the old regime (Allen, 2003; and Male, 1971).

[56] In reaction to the slow transition of former serf villages to redemption, and to the perception that tax and land payment arrears were increasing, legislation in 1881 lowered payment levels from 1883 onward and made redemption mandatory (PSZ, 3rd Ser., Nos. 577 and 585). The reduction in payments was substantial: one ruble from every soul allotment, plus additional discounts for certain villages. This was approximately 13% of the per-year obligations in the central provinces. This was calculated from village-level data on reductions made in Petersburg province (RGIA: 577.50.1071.2). Also see Table 5. On the lowering of payments, see Zaionchkovskii (1960, p. 318) and below. All former serf-owners that were forced to enter redemption at this time received 88% of the property's valuation.

Most of the land held by the peasantry was the direct result of the land reform process and was essentially fixed after 1866. This allotment land – owned collectively by the new communal institutions – was legally distinguished from private land holdings, and it was difficult to shift property between the two categories. In aggregate by 1905, across European Russia, allotment land amounted to approximately 124 million *desiatina*, while individual peasants, peasant partnerships, and the communes themselves owned roughly 24.6 million *desiatina* in total under private ownership (Russia, Tsentral'nyi, 1906).[57] Within the peasantry, the second panel of Table 2 indicates that serfs had access to less property than state (or court) peasants by the late 1850s. This is true even if only districts with both state peasants and serfs are considered. The bottom panel of Table 2 indicates that the average allotment per household was considerably smaller among former serfs in 1905 (again, this holds if the same set of districts are considered for each type of peasants).[58] These statistics are consistent with the former legal status of the peasant population generating long-run differences in land endowment *levels*, but the data also allow us to consider other dimensions of persistence, including the level of property inequality.

[Insert Figure 6 about here]

Figure 6 depicts geographic variation in four other outcomes stemming from the reform process. Figure 6a indicates the average landholding of the nobility in 1905 (also see Table 2). The uniquely large-scale of Russian serfdom depicted in Figure 3 is reflected here, as the size of land holdings in 1905 was highly correlated (0.76) with the mean number of souls on large estates in the late 1850s (Table 2 and Appendix Table 3). The 1-2 percent of the population in the noble class continued to own large properties, particularly in the eastern and southwestern provinces of European Russia. Mean peasant holdings per household were much smaller (Figure 6b.i and ii), although peasants tended to hold relatively larger properties in the central and northwestern provinces. In comparing Figure 6b.i and ii (also see Appendix Table 1), access to private property via developing markets for non-allotment land did allow peasants to expand their holdings by roughly 2.5 *desiatina* per household by 1905. The acquisition of private property was somewhat more evident in central provinces. However, the difference between mean allotments and total holdings in a district was uncorrelated with the serf share of the population in the 1850s, with the share of serfs who were exclusively on quit-rent, or with various indicators of agricultural productivity (Appendix Table 2; other results available upon request).

Figure 6c shows the variation in property inequality in 1905, with or without communal allotment land included.[59] These indicators are derived from the underlying size distribution of

[57] Communes purchased private property after 1861. To compare, by 1905 the nobility owned about 53.1 million *desiatina*, while all private property amounted to 97 million *desiatina* in European Russia. The state, through various chancelleries and ministries, along with other private institutions (churches, charities, etc.) held approximately 140 million *desiatina*, most in the far north and other peripheral regions (Russia, Tsentral'nyi, 1906).

[58] Appendix Table 1 provides evidence that the total amount of land per peasant household – both allotment and all types of private holdings – was significantly less in 1905 in districts where serfdom was more prominent. This difference was even greater when allotment land only is considered (not shown).

[59] All the variables depicted in Figure 6 are defined at the district-level, and so land holdings split across multiple districts are necessarily treated as separate. While this means that we are undercounting the largest landholdings and overstating the number of medium and smallholdings, the extent of this bias is likely small, given the relatively large size of Russian districts. Private holdings of various joint and collective entities (partnerships, peasant communes owning non-allotment land, corporate holdings, etc.) are treated as single properties under one owner for the

land among more than twenty bins under and more than a dozen types of private and collective property owners (resulting in considerably richer data than are available for other contemporaneous societies such as the United States or Germany). These maps indicate that property inequality was higher in the northwestern provinces and some of the more agricultural productive districts in the western Ukrainian region. Unsurprisingly, the inclusion of allotment land per peasant household – which we are forced by the data to assume does not vary within a community – resulted in a lower level of inequality.

Besides the amount of land, the reform process also dictated the subsequent size of the payment obligations imposed on the new peasant property rights. The top several rows of Table 5 present summary statistics on these payments before and after they were lowered in 1883.[60] This lowering reduced redemption payments among former serfs from 1.7 to just over 1.3 rubles per *destiatina*, but they still remained much higher than the redemption obligations faced by the former state peasants in 1886. However, accumulated redemption payment arrears were actually lower as a share of yearly assessments in districts where serfdom was more prevalent. This may have simply reflected better economic or agricultural opportunities in those districts, rather than anything particular to serfdom. We explore this more explicitly in the next subsection.

The redemption settlements not only fixed land payments, but they indirectly set various state and local property taxes. By fixing property rights, the reforms largely determined the assessment base for peasant and non-peasant landowners in each district. While the taxation rates could be determined locally, at least in part, Panel B of Table 5 indicates that the total tax assessments from state, peasant government, and district (*zemstvo*) authorities in 1895 and 1903 were somewhat higher in those districts where serfdom had been more prevalent. Moreover, accumulated arrears were significantly lower, on average, in those same districts. Both of these findings are consistent with the endogenous location of serfdom itself if the institution emerged where it was particularly in the interest for the early service class to accumulate land and consolidate control over a mobile labor force – i.e. where land was more productive.

2.4 Econometric Evidence

The evidence presented in Section 2.3 suggests a correlation between the variation in serfdom / emancipation and the subsequent nature of land endowments across rural Russia. However, this connection may simply indicate underlying agro-climatic conditions. Therefore, it is useful to extend the analysis in Section 2.3 by employing a simple econometric framework and controlling for the geographic characteristics we can observe at the district level. Unfortunately, the relative paucity of data at such a level of disaggregation leads us to focus on a very parsimonious set of specifications, whose results are presented in Table 6. The right-hand-side variables of interest are three different measures of serfdom – the overall share of the population in the late 1850s, the share of serfs on "large estates," and the share of serfs exclusively on quit-rent. The dependent variables we focus on are various indicators of the level of, change in, or distribution of post-

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purposes of Figure 6. The owners of allotment land and private property are necessarily treated as non-overlapping groups in the calculation of the Gini coefficient in Figure 6c.ii.

[60] This lowering deducted roughly one ruble per soul allotment from all redemption settlements. Also, communities that were having particular difficulty fulfilling their redemption payments (as concluded by researchers in the Ministry of Finance) received a "special" reduction. See PSZ (3rd Ser., Nos. 577 and 585) and Footnote 50.

reform land endowments, or closely related payment outcomes such as the amount or arrears of redemption and tax obligations. In terms of geography, we are only able to control for latitude and longitude, provincial fixed effects, and a small number of other indicators.[61] In addition, most of the specifications also include population density as a simple way to control for local economic conditions.[62] The latter two specifications in each panel use the percentage of the population who were serfs in 1860 as weights on the observations. Only some of the models we estimated are reported in Table 6. We have experimented with a variety of other model and functional forms, all of which are available upon request.

Without a more explicitly structural model (or a fuller set of covariates), the preliminary results in Table 6 are best thought of as signaling correlations worth exploring in more depth, either in and of themselves, or as paths through which serfdom had lingering implications for other aspects of economic development. Despite this caveat, several important results emerge from these exercises. The population share of serfs was positively associated with the *decline* of noble landownership between 1877 and 1905, while showing only a relatively small negative relationship to the total size of peasant landholdings in 1905 (once province fixed effects are taken into account). Comparing this result with the data shown in Table 2 suggests that former serfs were likely able to compensate for their smaller endowments by accessing land markets, often to acquire land from the local nobility. In areas where *obrok* had dominated, which likely had lower agricultural productivity, peasants held slightly smaller holdings. This is consistent with regional sectoral specialization over the period. Finally, those districts where larger serf estates dominated saw a slower relative decline of noble land ownership and slightly smaller peasant properties by 1905. This may have been due, in part, to the continued monopsony positions in land and labor markets held by these former serf owners.

When we consider the implications of serfdom for property inequality, we find that the population share of serfs in 1860 was strongly associated with more unequal districts. This likely reflects the estate-specific nature of the redemption process under the control of the former serf owners. Quit-rent areas, which predominated in the less agricultural central and northern provinces, were more unequal, although the size of this correlation was small. Districts with larger serf estates were more unequal half a century later, although access to allotment land seemed to mitigate this correlation. Overall, it appears that the distribution of serfdom had persistent implications for the distribution of property. If land inequality had effects on the provision of public goods, or impacted investment or structural change through some sort of wealth channel, than these findings might point to an important channel by which serfdom may have mattered for subsequent development outcomes.

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[61] The provincial fixed effects not only pick up geographic factors, but they also control for various fixed legal and cultural characteristics of each district's region. Dropping latitude and longitude had little impact on the other estimated coefficients. In modeling the "determinants" of the Gini coefficients, we also include the share of land owned by anyone at all as a covariate to control for a particular set of outlier districts (where one or two individuals owned most of a small amount of privately held landed property). Including this variable had no effect on other results. In all models, standard errors are clustered at the provincial level.

[62] Although this may introduce some endogeneity concerns, we rely on pre-determined (relative to the dependent variables) or reform-era (early 1860s) measures of population density to minimize such possibilities. Controlling for population density in such specifications follows research into land inequality and economic development by Nunn (2008b) and Cinnerella and Hornung (2011).

Besides the direct implications of serfdom for the distribution and size of land holdings, the available data allow us to econometrically explore the variation in the redemption and property tax "prices" associated with these endowments (the bottom four panels of Table 6). Our analysis does indicate somewhat higher redemption and tax assessments in formerly *obrok* districts, where the land settlements often over-valued holdings relative to their agriculture productivity. As state and local property taxes were often closely tied to the redemption values, this difference appears to have persisted through the fiscal structure until at least the end of the century. However, utilizing just a few cross sections of the available data, we find relatively weak relationships between the indicators of serfdom and any measure of arrears on redemption or tax payments (denoted as 100 x accumulated arrears relative to total yearly assessments).[63] Although this latter result may be subject to bias from some unobservable influences on tax rates, the implication of these findings is that the legacy of serfdom mattered little for the ability of peasants to meet their obligations by the 1890s. This contradicts much of the traditional literature (i.e. Gerschenkron, 1965; and Robinson, 1972), which viewed rising arrears among former serfs as a sign that emancipation and redemption limited rural economic development. Moreover, the absence of any association between arrears and serfdom holds even though more serf areas (and those where estates were larger) showed persistently higher levels of obligations, despite several reductions of redemption payments over the period.

3 Concluding Thoughts

The results from Table 6 suggest that serfdom and emancipation, while influencing the allocation of land in the following decades, may not have had much impact on the payment abilities of the peasantry. Was this the case for other dimensions of economic development in the medium and long term? Although we do not currently have modern data on per capita incomes or other measures of development, as in Acemoglu et al. (2012), Bertocchi and Dimicio (2012), or Dell (2010), our more immediate goal is to examine indicators of structural change and human capital development at the very end of the Imperial period. The massive population, institutional, and economic changes enacted by the Soviet authorities, not to mention the large-scale changes in administrative borders, make any attempts to link pre-1917 variation to modern outcomes difficulty in practice and perhaps questionable on practical and theoretical grounds.[64] But if serfdom and the way it ended had implications for the nature (and variation) of economic change in the half-century after 1861, then Lenin's quote at the beginning of this paper may contain elements of truth.

In the recent studies of slavery by Acemoglu et al. (2012), Nunn (2008a), and Miller (2009), and in such influential works as Acemoglu et al (2002), Banerjee and Iyer (2008), and Engerman and Sokoloff (2002), the researchers are able to tie variation in "institutions" to some exogenous treatment or natural experiment. This has proved difficult in the Russian case. As we examined in Sections 1 and 2, serfdom and the redemption process varied widely based on observable and unobservable local conditions. The results in Tables 3 and 4 provide some suggestive evidence

[63] Summary statistics for these measures are available upon request.

[64] Some modern Russian surveys, such as the Russian Longitudinal Monitoring Survey, are geo-referenced and have standard income and consumption indicators, and matching these data to Imperial era, district-level information is possible given the GIS maps presented in this paper. However, the nature of the Soviet experience would suggest that such an effort may provide little return. For one attempt to map pre-1917 information to post-Soviet outcomes, see Zhuravskaya et al. (forthcoming).

of underlying factors that could have driven the observed institutional variation – particularly the monastic expropriation of the 18th century – but at this point in the research, we are still exploring various possibilities for identifying any relationships linking serfdom / redemption, property endowments and inequality, and economic outcomes. In preliminary regression work along these lines, we find relatively small correlations between serfdom / reform outcomes and measures of structural change and human capital accumulation. Although the models we employ in this complementary research and through out the current paper are purposefully parsimonious and exploratory, we hope to improve upon them by incorporating much better geographic and climatic controls, particularly from modern GIS sources such as the FAO's crop suitability indicators. This will partially abrogate the problem of unobservables in models such as those of Tables 3, 4, and 6, but unless a relatively clean "experiment" can be developed, causal identification of development effects may prove elusive.

There is perhaps an even deeper problem with attributing causation to "serfdom." While Table 6 does appear to show some longer-run relationships between characteristics of serfdom and land endowments and associated "prices," this was at least partially the result of the unique process of land reform that accompanied Russian serf emancipation, rather than due to various mechanisms of institutional persistence from the coercive labor regime itself. The redemption process may generated idiosyncratic variation in outcomes. Some of the resulting "endowment effects" can be controlled for alongside explicit measures of "serfdom," in any estimates of effects on other development outcomes. But this might not be appropriate in all cases. The land reform process varied geographically in ways that were certainly correlated with the same set of observable (reflected in the local details of the Emancipation and Redemption statutes) and unobservable factors associated with serfdom. Therefore, and given the timing of the available data, our current research approach is perhaps best understood as an exploration into the economic consequences of a joint package of institutions and institutional changes surrounding *both* serfdom *and* the complicated process of emancipation and land reform. In future work, we hope to examine distinct elements of this dynamic set of institutional conditions to better identify the channels by which each *individually* might have influenced economic development up to and into the 20th century.

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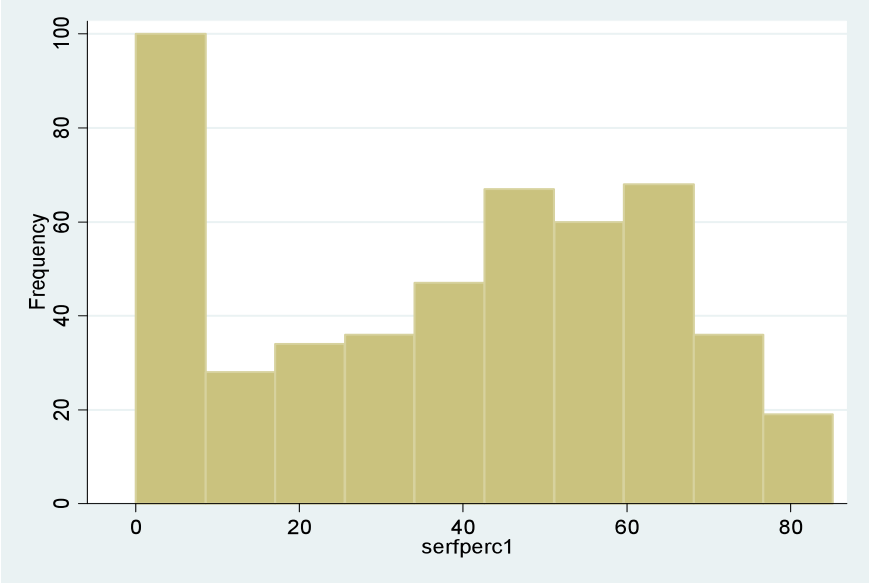
Table 1: Provincial Indicators of Serfdom in European Russia, c. 1858

Provinces	Total Population, c. 1860	Serfs (*krepost'nie liudi*), c. 1858		
		Share of Total Population	Share of "Household Serfs" of All Serfs	Share of Serfs on Only Quit-Rent Obligations
Arkhangel'sk	284082	0.01	100.00	.
Astrakhan	264374	4.71	4.65	80.85
Bessarabia	957133	1.04	46.11	??
Chernigov	1471866	37.61	9.69	0.14
Ekaterinoslav'	934139	33.09	15.86	0.13
Estliand	303478	0	.	.
Grodnno	881881	40.05	3.74	1.93
Iaroslavl'	976866	56.45	5.12	83.07
Kaluzha	1007471	57.14	5.15	52.23
Kazan	1543344	13.79	7.48	12.93
Khar'kov	1583571	29.75	19.37	1.17
Kherson	1114248	28.83	18.83	0.03
Kiev	1944334	57.66	0.65	1.50
Kostroma	1076988	57.31	5.14	83.30
Kovno	988557	36.89	4.01	29.18
Kurliand	754725	0	.	.
Kursk	1812035	38.67	19.77	19.98
Lifliand	897603	0	.	.
Minsk	987471	60.55	2.41	2.54
Mogilev	884640	64.63	2.66	2.94
Moscow	1599808	38.42	4.67	64.84
Nizhegorod	1259606	57.58	2.56	66.93
Novgorod	1134078	43.05	6.40	41.76
Olonets	287354	3.92	6.86	67.11
Orel	1532034	46.87	12.16	18.25
Orenburg	914308	2.66	9.72	19.61
Penza	1188528	45.92	7.04	22.83
Perm	2046481	18.64	3.71	2.15
Petersburg	1053975	24.23	5.16	65.25
Podol'sk	1748466	59.49	0.61	3.11
Poltava	1819110	37.47	12.60	0.50
Pskov	706462	53.81	5.14	21.99
Riazan	1427299	55.45	8.75	37.65
Samara	1530039	15.25	8.60	19.21
Saratov	1636135	40.19	6.71	??
Simbirsk	1140973	38.78	5.78	23.38
Smolensk	1102176	68.82	6.46	25.64
Tambov	1910454	39.00	10.67	21.19
Taurida	687343	5.97	13.15	0.00
Tul'a	1172249	68.53	8.35	23.17
Tver	1491427	50.63	5.49	40.16
Ufa	1597577	7.03	8.14	6.53
Viatka	2123934	1.74	4.35	61.92
Vilno	876116	45.60	4.83	6.90
Vitebsk	635021	57.06	2.86	0.00
Vladimir	1207908	56.99	3.76	67.11
Vologoda	960593	22.40	3.54	81.05
Volyna	1528328	56.53	0.05	0.00
Voronezh	1930859	26.79	12.71	39.43
Don Cossack Land	945576	21.50	1.75	3.26
Totals / Means	59863023	36.39	6.69	25.68

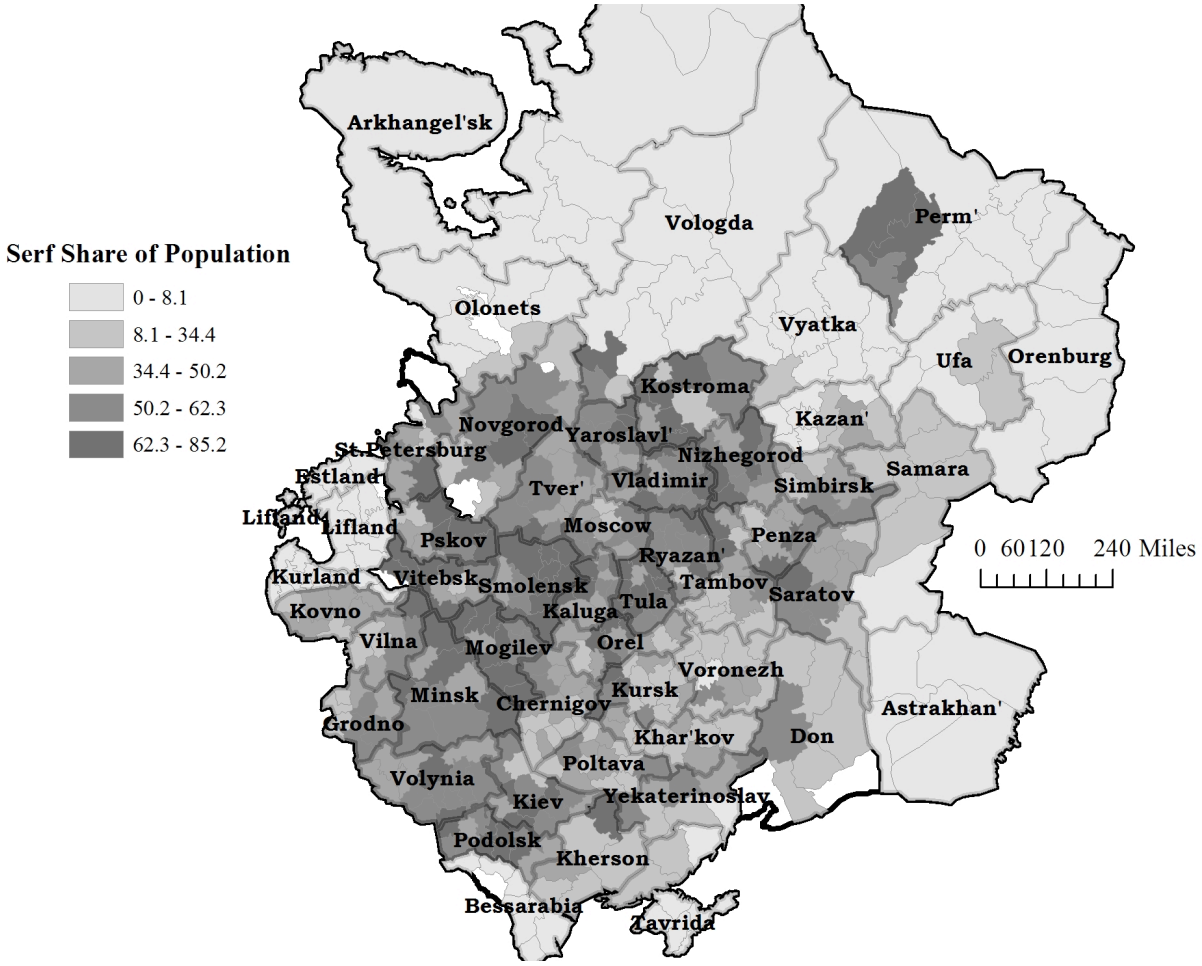
Note: The data are from Bushen (1863), Russia, Tsentral'nyi (1866), Skrebitskii, ed. (1865/6), and Troinitskii, ed. (1982). "??" – Missing data; "." – not applicable

Figure 1a: The Frequency Distribution of Serfdom by District



Note: The variable of interest is the portion of the total population who were serfs, c. 1858. The height of the bars corresponds to the number of districts with serf population shares in a given bin. These data are taken from Bushen (1863) and Troinitskii, ed. (1982).

Figure 1b: The Geographic Distribution of Serfdom by 1860



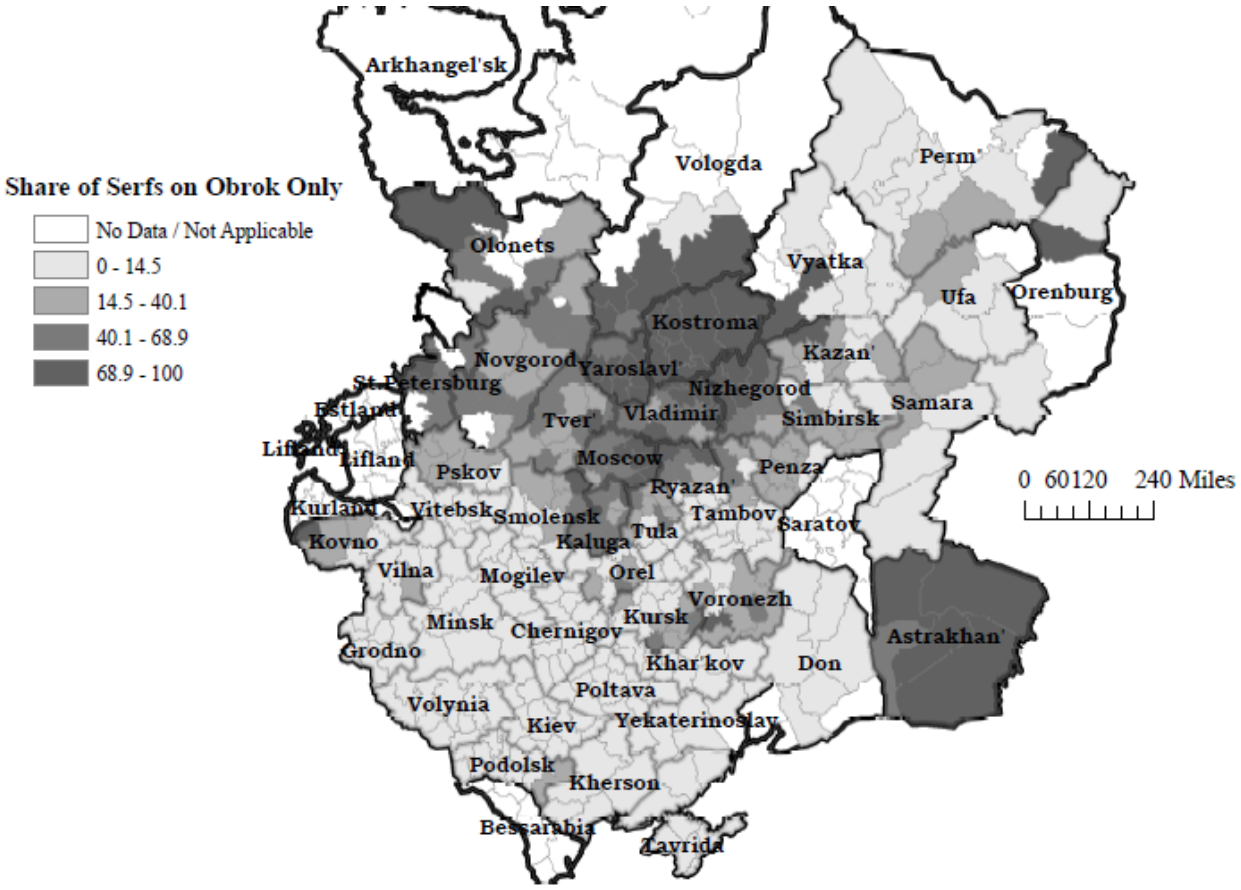
Note: The figure presents the district (*uezd*)-level distribution of serfdom c. 1860, as the measured by dividing the number of serfs in 1858 (according to the 10th tax revision) by the total population measured in 1863 (according to tax lists). See Table 2 for sources.

Table 2: Serfdom, Land Holdings, and Obligation Levels, c. 1858 and 1905

	N	Mean	SD	Min	Max
From Various District-Level Data Sources					
Share of the total population who were serfs, c. 1858	494	36.39	24.42	0	85.21
Share "household" (*dvorovye*) serfs of all serfs, c. 1858	458	6.69	6.23	0	100
Share of serfs exclusively on quit-rents (*obrok*), c. 1859	430	25.68	29.92	0	100
Quit-rent (*obrok*), silver rubles per work team (*tiagla*), c. 1858	306	25.46	9.66	6.34	115
Land Holdings per Peasant Male Soul (in *desiatiny*), c. 1858					
Serfs	387	3.33	1.63	0.4	13
State peasants	351	6.29	5.14	1.05	52.1
Court peasants	110	4.32	3.25	1.3	33
Noble estates (all land, including land allocated to serfs)	424	13.80	27.25	3.5	354.9
Self-Reported Data on "Large Estates", 1858-1859					
Size of estates (male souls per estate, mean across district)	367	333.83	245.61	30	6563
Share *dvorovye* serfs of all (male) serfs	360	5.20	3.87	0	34.37
Share of *tiagla* exclusively on quit-rents	366	24.78	27.13	0	100
Implied share of (male) serf population on "large estates"	376	64.86	15.95	0	100
Gini coefficient of estate sizes among large estates	367	0.42	0.10	0	0.82
Land Holdings per Household / Landowner (in *desiatiny*), 1905					
Former serfs – allotment land only	450	6.71	2.92	0.23	42
Other peasants (state, court, Baltic, etc.) – allotment land only	487	12.51	8.64	0.82	143.4
Noble landowners – only single owners	492	494.90	2746.2	4	184062
In districts where % serfs in 1850s > 50%	200	532.87*	3603.4	41.30	184062

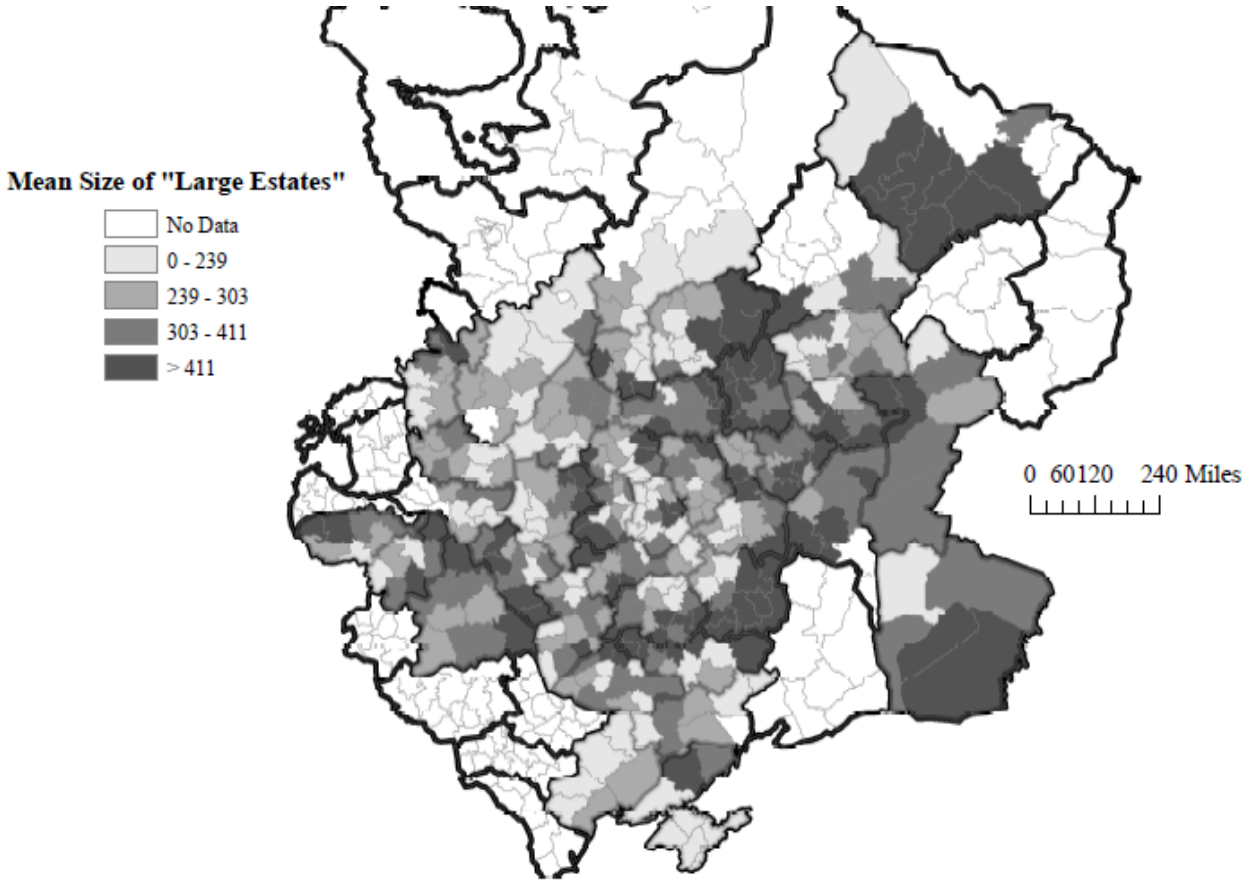
Note: These data come from Bushen (1863), Skrebnitskii, ed. (1865/66), *Svedeniia* (1860), Troinitskii (1982), and Russia, Tsentral'nyi (1906). "Estates" refer to holdings within a district under one landowner. Serf owners often owned estates in multiple districts. For 102 districts, the quit-rent was defined as the mean between low and high amounts among estates. The exceptionally high quit-rents in Kovno provnce were all defined in this way. The data on large estates are unavailable for Bessarabia, Grodno, Kiev, Olonets, Orenburg, Podol'lia, Ufa, Volynia, and parts of several other provinces. Why these data were not reported in *Svedeniia* (1860) remains unclear. These variable means are weighted by the relevant denominator, except for the *obrok* and land holdings in 1858, where such information was unavailable. One *desiatina* = 2.7 acres. * indicates that the subsample mean is statistically different from the rest of the sample at the 95% significance level.

Figure 2: The Geography of Serf Obligations, c. 1858



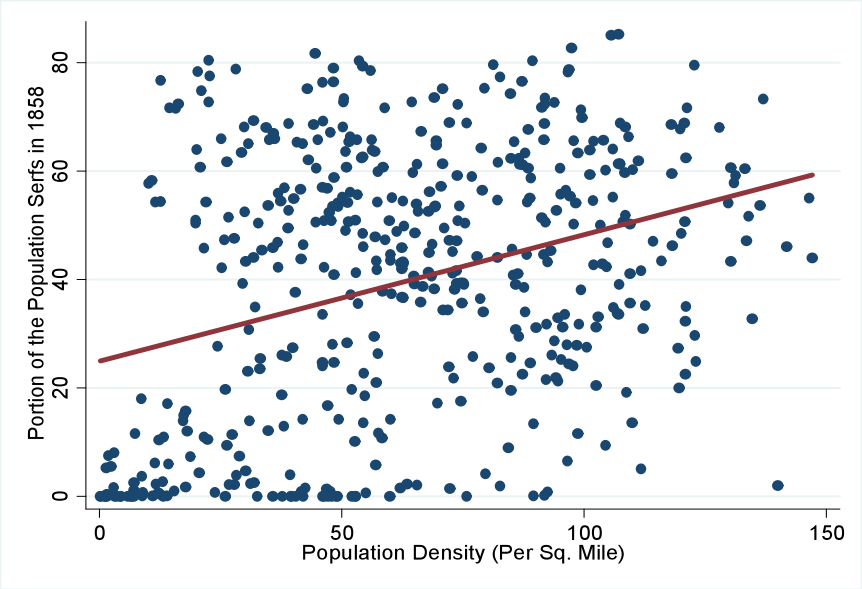
Note: The figure presents the district (*uezd*)-level distribution of serf obligation type, c. 1858, as indicated by the share of peasants *only* on *obrok*. White colored districts reflect either the absence of data or the share does not apply, as there were no serfs. See Table 2 for sources.

Figure 3: The Size of "Large Estates"



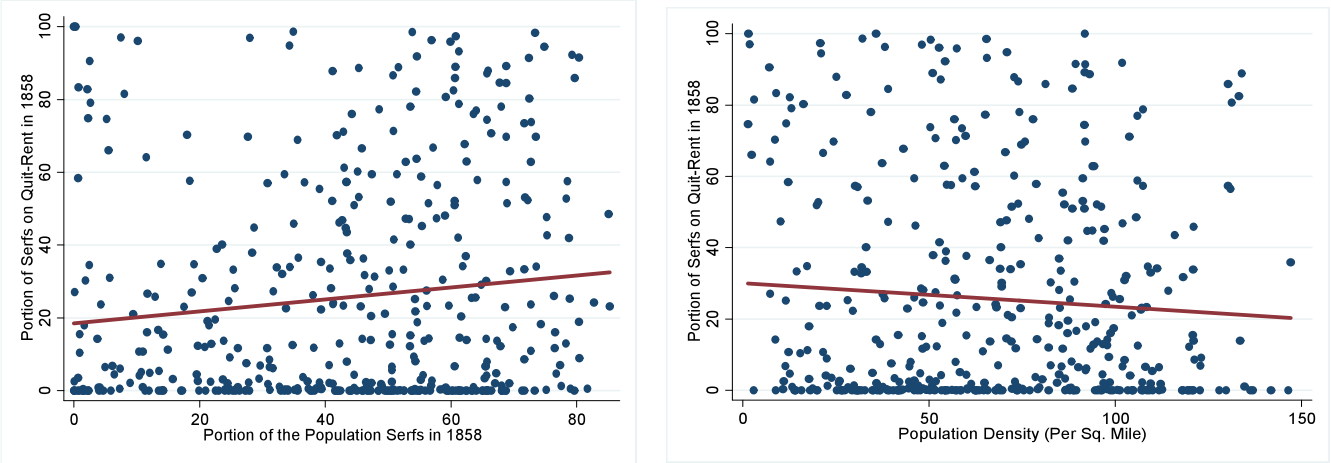
Note: The figure presents the district (*uezd*)-level means of the size of large estates, c. 1858, as measured by the number of male souls. White colored districts reflect either the absence of data or the non-applicability of the indicator. See Table 2 for sources.

Figure 4: Population Density and Serfdom, 1858



Note: N = 424. The figure excludes Moscow and St. Petersburg districts and is limited to the same sample as Figure 5. The plotted line is the least squares line. See Table 2 for sources.

Figure 5: Serfdom, Obligations, and Population Density



Note: The sample is the same as in Figue 4. See Table 2 for information on source

Table 3a: Parsing Out the Variation in Serfdom - Basic

Dependent Variables:	% Serfs, c. 1860			% of Serfs on Quit-Rent Obligations only			
	1	2	3	4	5	6	7
Pop. Density, 1860 (sq. mile)	-0.0313	-0.0747***	-0.0700***	-0.0573	-0.0185	-0.0164	0.0103
Mean = 70.5, SD = 50.6	(0.0377)	(0.0138)	(0.0118)	(0.0540)	(0.0168)	(0.0177)	(0.0183)
Latitude			2.980**			3.880*	4.169**
			(1.354)			(2.187)	(1.98)
Longitude			-0.472			0.318	0.334
			(0.696)			(0.938)	(0.911)
Distance to Moscow (Kms)	-0.0340***	-0.0400***		-0.0473***	-0.0164		
Mean = 587.5, SD = 305.8	(0.0078)	(0.0133)		(0.0092)	(0.0206)		
Mean Oat Yield, 1884-1900 [seed ratio]							-3.040***
Mean= 7.8, SD = 1.4							(0.969)
Observations	431	431	431	415	415	415	414
(Within) R2	0.216	0.085	0.063	0.217	0.008	0.031	0.067
Province Fixed Effects?	No	Yes	Yes	No	Yes	Yes	Yes

Note: Regressions only consider districts where the share of serfs was greater than 1%. All regressions include constants and utlize robust standard errors clustered at the level of the province. The mean values of the dependent variables are provided in Table 1.

Addendum to Table 3: Correlation Matrix of the Regression Variables

	serfperc	obrokshare	oatyield	popdens1858	moscowdist	latitude	longitude
serfperc	1.0000						
obrokshare	0.1345	1.0000					
oatyield	0.1770	0.0609	1.0000				
popdens1858	0.0301	0.0111	0.3736	1.0000			
moscowdist	-0.4610	-0.4661	-0.2287	-0.2202	1.0000		
latitude	0.1623	0.5678	0.2091	-0.0833	-0.4790	1.0000	
longitude	-0.3332	0.2949	0.0262	-0.1390	0.0135	0.2753	1.0000

Note 2: Latitude, longitude, and distance from Moscow variables were constructed from the information on the location of district capitals in 1863 (assumed to represent the entire district), as provided in Russia, Ministerstvo (1863) and supplemented by Google Maps. The distance to Moscow was calculculated as the arc distance to the district capital. The oat yield variable (seed ratio) comes from Russia, Ministerstvo (Vol. 1, 1900) and reflects mean values of the yearly reported data of local correspondents to the Ministry of Agriculture and State Property over the period 1884-1900.

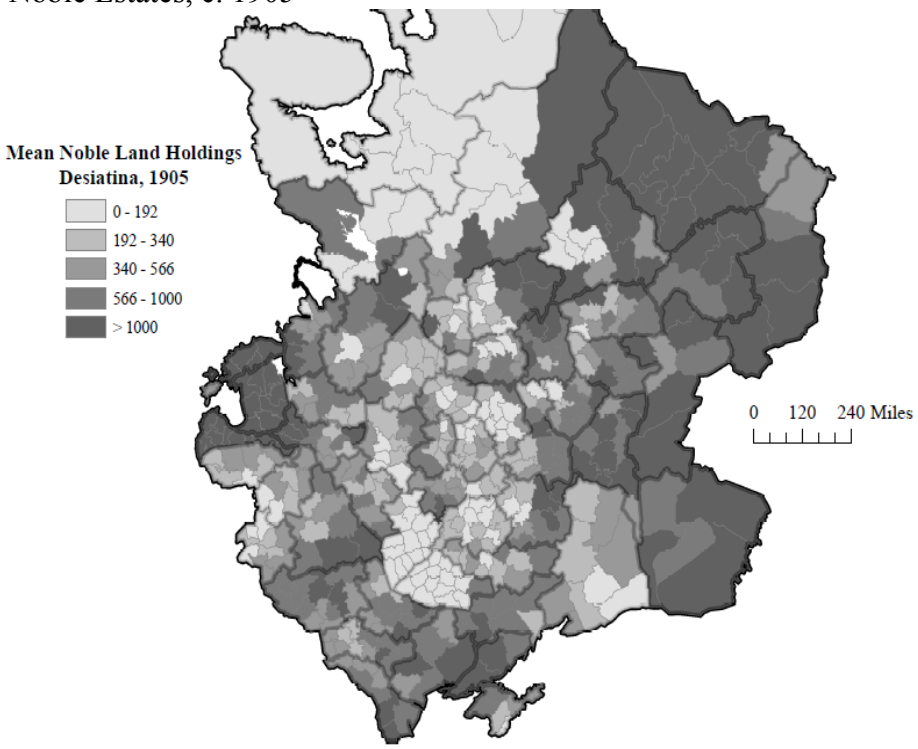
Table 4: Parsing Out the Variation in Serfdom – Using "Failed" Monasteries as a Control Variable

Dependent Variables:	% Serfs, c. 1860	% Serfs on Quit-Rent Obligations only
Pop. Density, 1860 (sq. mile)	-0.077***	-0.0180
Mean = 70.5, SD = 50.6	(0.012)	(0.0171)
Latitude	1.345	-0.00199
	(1.284)	(0.0209)
Distance to Moscow (Kms)	-0.035**	3.871*
Mean = 587.5, SD = 305.8	(0.013)	(2.192)
"Failed" Monasteries	- 7.684***	-3.610
Mean = , SD	(2.430)	(4.175)
Observations	431	415
(Within) R2	0.104	0.033
Province Fixed Effects?	Yes	Yes

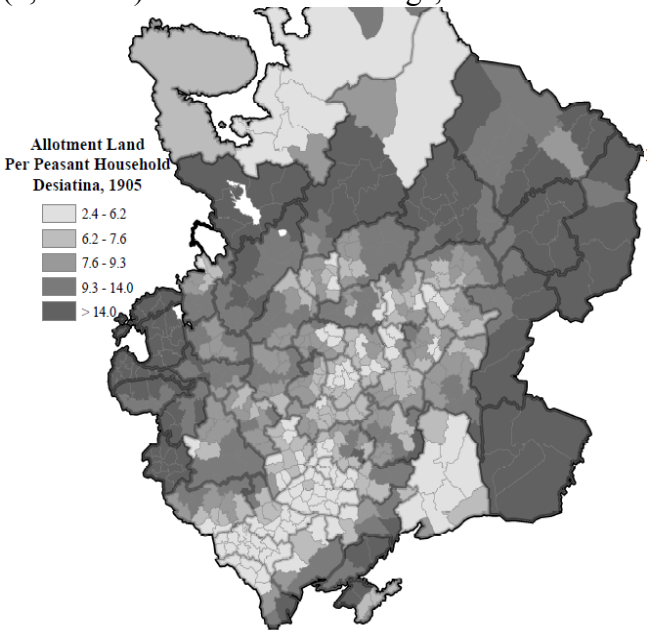
Note: The variables, sources, and sample restrictions are the same as in Table 3a. See Appendix Table 1 and other tables for additional summary statistics. Regressions are OLS with provincial fixed effects and constant terms. The "Failed" Monasteries variable is the number of monastic institutions (including convents), for which any evidence of their existence is available, which ceased operating prior to 1764. We compiled these counts at the district-level from the list reported in Zverinskii (2005 [1897]).

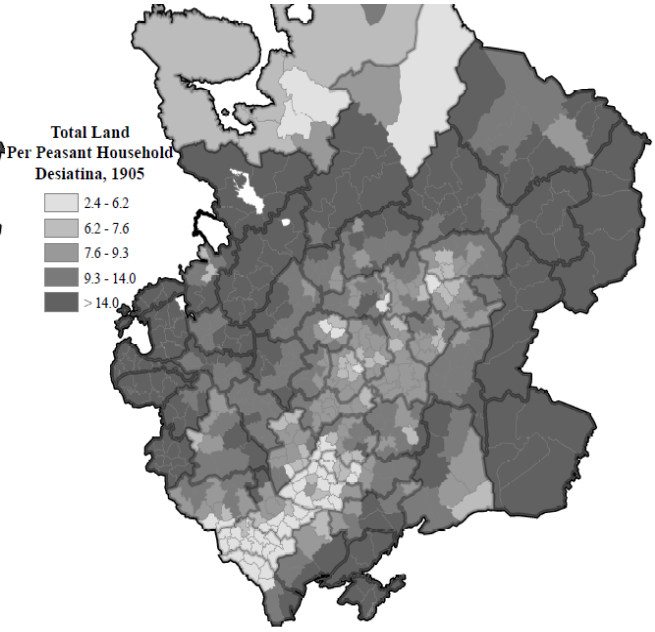
Figure 6: Endowment Implications of the Land Reform Process

(a) The Size of Noble Estates, c. 1905

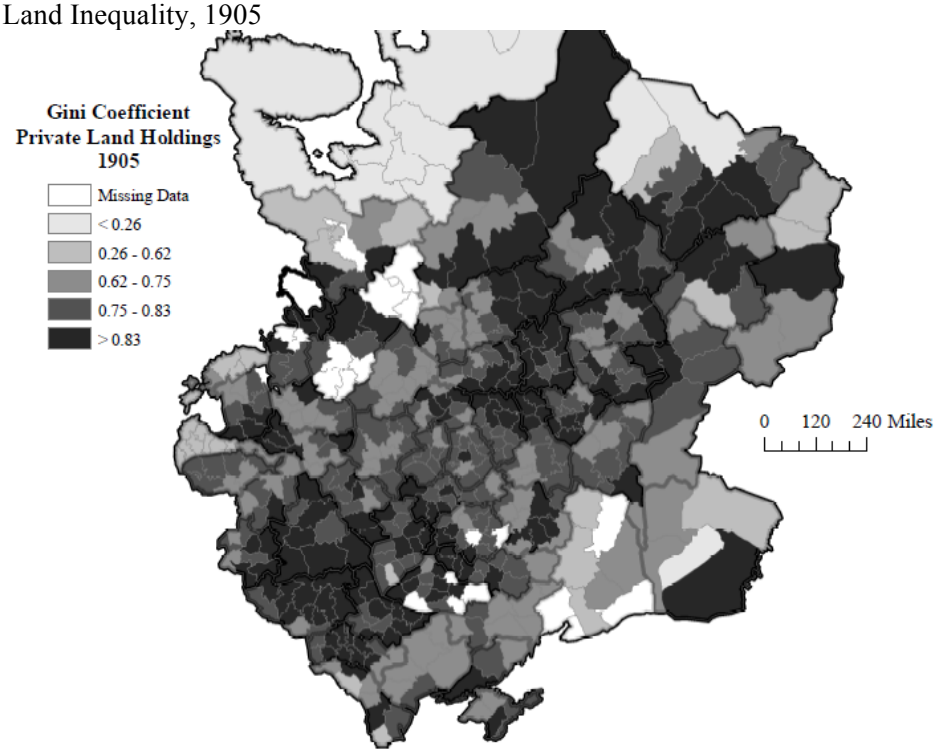


(b, i and ii) Peasant Landholdings, c. 1905

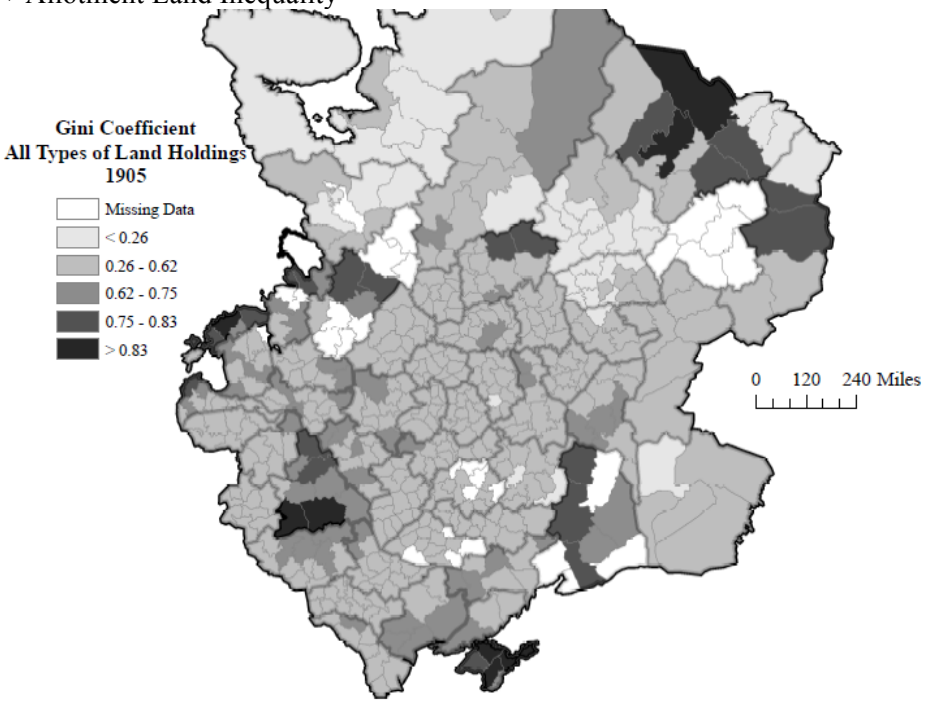




(c, i) Private Land Inequality, 1905



(c, ii) Private + Allotment Land Inequality



Note: See text and Appendix Table 1 for more information on these variables. The values of each variable increase as the shading darkens. White areas reflect missing or non-applicable data. Land areas are defined in desiatiny (1 *desiatina* = 2.7 acres). The source for all data is Russia, Tsentral'nyi (1906).

Table 5: Redemption Payments and Property Taxes – The "Price" of Endowments

Variables	Mean	SD	Min	Max	N
A. Land Redemption Payments					
Yearly redemption assessment per *desiatina*, 1883	1.79	0.50	0.51	2.92	367
Former serfs only, pre-lowering					
Yearly redemption assessment per *desiatina*, 1886	1.31	0.48	0	2.40	368
Former serfs only, post-lowering					
Yearly redemption assessment per *desiatina*, 1886	0.86	0.44	0.04	4.05	395
Former state peasants only					
Accumulated redemption payment arrears by 1895	71.96	121.52	0	946.2	450
In districts where % serfs in 1850s > %50	64.85*	107.04	0	514.6	200
All types of peasants, 100 x % of yearly assessment					
B. Tax Obligations (Without Redemption Payments)					
Total tax assessment per *desiatina*, 1895, all types of peasants	1.41	0.81	0.03	7.74	498
In districts where % serfs in 1850s > %50	1.81*	0.69	0.63	3.46	200
Accumulated tax arrears by 1895, all types of peasants	76.36	100.03	0.18	607.7	498
In districts where % serfs in 1850s > %50	54.63*	72.87	0.18	346.5	200
100 x % of yearly assessment					
Total tax assessment per *desiatina*, 1903, all types of peasants	1.42	0.94	0.05	26.78	498
In districts where % serfs in 1850s > %50	1.72*	1.09	0.12	13.72	200
Accumulated tax arrears by 1903, all types of peasants	12.18	14.91	0.08	120.5	498
In districts where % serfs in 1850s > %50	9.32*	12.89	0.09	114.7	200
100 x % of yearly assessment					

Note: These data are observed at the district level. The tax assessments are defined as rubles per *desiatina* of peasant allotment land. The data from before and after 1883 are from Russia, Tsentral'nyi (1885 and 1886a). The 1886 data were compiled from Khodskii (1891, vol. 2). The data on redemption arrears from 1895 are drawn from Russia, Departament (1897), while the tax data from that year come from Russia, Departament (1902). The 1903 tax data are from Russia, Departament (1909).

Table 6: Serfdom, Emancipation, and Factor Endowment Variation in Late Imperial Russia

Dependent Variable:	% Δ in Nobility's Land Share,1877 - 1905				Total Land (*desiatiny*) per Peasant HH in 1905			
% of Serfs	0.176***	0.138***			-0.174***	-0.046		
Of population, c. 1860	(0.023)	(0.026)			(0.056)	(0.027)		
% of *tiagla* on quit-rents			0.011				-0.026**	
Exclusively obrok, c. 1858			(0.035)				(0.013)	
% of serfs on large estates				-0.117**				-0.035**
Males, c. 1858				(0.044)				(0.015)
Observations	483	483	424	376	492	492	430	376
R^2 (overall)	0.243	0.142	0.074	0.137	0.337	0.239	0.397	0.346
Provincial Fixed Effects?	No	Yes	No	No	No	Yes	No	No
Additional Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dependent Variable:	Gini Coefficient, Private Land Only, 1905				Gini, Private + Communal Land, 1905			
% of Serfs	0.171***	0.112***			0.252***	0.363***		
Of population, c. 1860	(0.060)	(0.029)			(0.054)	(0.039)		
% of *tiagla* on quit-rents			0.036*				-0.094***	
Exclusively obrok, c. 1858			(0.019)				(0.026)	
% of serfs on large estates				0.101***				-0.038
Males, c. 1858				(0.032)				(0.030)
Observations	477	477	415	362	468	468	407	359
R^2 (overall)	0.278	0.110	0.195	0.189	0.390	0.295	0.457	0.423
Provincial Fixed Effects?	No	Yes	No	No	No	Yes	No	No
Additional Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dependent Variable:	Yearly Redemption Payment per *Desiatina* Among Former Serfs, pre-1883				Total Arrears / Yearly Redemption Obligations, 1895			
% of Serfs	0.002	-0.000			-0.395	-0.112		
Of population, c. 1860	(0.001)	(0.001)			(0.417)	(0.266)		
% of *tiagla* on quit-rents			0.004***				-0.359	
Exclusively obrok, c. 1858			(0.001)				(0.614)	
% of serfs on large estates				-0.002				0.525
Males, c. 1858				(0.002)				(0.350)
Observations	366	366	352	338	445	445	425	365
R^2 (overall)	0.628	0.450	0.717	0.674	0.351	0.192	0.329	0.303
Provincial Fixed Effects?	No	Yes	No	No	No	Yes	No	No
Additional Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dependent Variable:	Total (Non-Redemption) Peasant Tax Obligations per *Desiatina*, 1895				Total Non-Redemption Tax Arrears / Total Tax Obligations, 1895			
% of Serfs	-0.001	0.005***			-0.385	-0.130		
Of population, c. 1860	(0.006)	(0.001)			(0.277)	(0.177)		
% of *tiagla* on quit-rents			0.006***				-0.264	
Exclusively obrok, c. 1858			(0.001)				(0.356)	
% of serfs on large estates				0.001				0.235
Males, c. 1858				(0.002)				(0.221)
Observations	489	489	427	373	489	489	427	373
R^2 (overall)	0.286	0.238	0.620	0.581	0.302	0.165	0.342	0.297
Provincial Fixed Effects?	No	Yes	No	No	No	Yes	No	No
Additional Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: *** p<0.01, ** p<0.05, * p<0.1. Specifications are at the district level. Robust and clustered standard errors are in parentheses. All regressions are OLS with or without provincial fixed effects. Sample sizes vary due to missing data and the non-applicability of several controls to parts of European Russia without serfdom. Quit-rent and "large estate" specifications are weighted regresssions where the weights are the shares of the population who were serfs, c. 1860. "Additional Controls" include latitude and longitude of the district seat, the share of land that was arable, the share in forests, and the population density in 1863, 1894, or 1904. Percentage and arrears / lowering variables are in percentage points. Gini coefficients are muliplied by 100. Payments are in rubles. Variables are summarized in Table 2, Table 5, and Appendix Table 1.

Appendix Table 1 – Additional Summary Statistics for District-Level Data

	N	Mean	SD	Min	Max
Latitude, measured in relation to district town, decimal conversion	499	54.05	3.85	44.5	68.87
Longitude, measured in relation to district town, decimal conversion	499	54.66	8.44	38.83	81.3
Total land per peasant household in *desiatiny*, 1905	500	12.38	8.93	2.50	176.31
In those districts with % serf in 1850s > %50	200	10.01*	4.66	2.98	34.60
Allotment land per peasant household (all types) in *desiatiny*, 1905	500	10.32	7.95	2.46	143.44
Percentage communal allotment land (of all owned land), 1877	487	37.6	21.7	0.4	92.1
Percentage communal allotment land (of all owned land), 1905	500	36.5	25.8	0.1	96.2
Percentage land owned by nobility (of all owned land), 1877	487	22.5	19.1	0	70.5
Percentage land owned by nobility (of all owned land), 1905	500	13.9	15.4	0	72.8
Gini coefficient, private land holdings only, 1905	481	0.77	0.14	0	0.98
Gini coefficient, private + communal holdings, 1905	472	0.47	0.15	0.00	0.90
In those districts with % serf in 1850s > %50	197	0.54*	0.11	0.29	0.85
Other Variables for Models of Tables 5 and 6					
Percentage of land defined as arable, 1881	495	42.10	22.12	0	83.58
Percentage of land defined as forests, 1881	495	27.62	19.82	0	97.6
Population per Square Mile, 1911	500	132.02	151.76	0.35	2670.8
Change in share of urban population (x 100), 1913 – 1863	495	1.34	5.53	-18.28	45.66
Agricultural share of the population (x 100), adult males, 1897	501	71.36	15.08	0.94	94.60
Rural primary enrollment rate (x 100), 1911	501	21.20	6.40	3.12	55.51
Total spending per capita on primary schooling (kopeks), 1911	493	54.30	28.82	10.76	223.13
Skill Premium (100 x Teacher / Agricultural Laborer Salary), 1910-11	450	309.28	81.81	80.30	685.57

Note: Latitude and longitude are taken from historical information presented in Russia, Ministerstvo (1863), with corrections made using Google Maps. The 1877 and 1905 land statistics are from the provincial volumes of Russia, Tsentral'nyi (1906). The 1881 land characteristics are drawn from Russia, Tsentral'nyi (1886b). The 1911 population density is defined from data presented in Russia, Tsentral'nyi (1912), while the change in the urban population share is derived from information in Russia, Tsentral'nyi (1866 and 1914). This latter variable is defined as the percent in 1913 minus the percent in 1863. Other population density variables were employed in the models of Tables 5 and 6 where appropriate – summary statistics and sources are available upon request. The agricultural share of the adult male population (in terms of primary occupation) is defined from the provincial volumes of the 1897 census (Troinitskii, ed., 1905). The 1911 primary school enrollment, spending, and teacher salary information is provided (mean across all teachers) in Pokrovskii, ed. (1916), while the salary information for a yearly agricultural laborer (mean of male and female workers) is taken from Russia, Tsentral'nyi (1913). The enrollment rate assumes that the school-age population is 20 percent of the total. Further details on the sources and methods used to construct these variables are available upon request. Means and standard deviations are weighted to represent the entire sample where appropriate in the top part of the table. The bottom variables are simple means across districts. The symbol * indicates that the subsample mean is statistically different from the rest of the sample at the 95% significance level. Also see the text and notes below several tables above.

Appendix Table 2: The Dynamics of the Serf Population, 1720-1858

Provinces	Total Population, 1858	Serfs (*krepost'nie liudi*)			
		Total Population Share, c. 1745 (II Revision)	Total Population Share, c. 1782 (IV Revision)	Male Population Share, c. 1835 (VIII Revision)	Total Population Share, c. 1858 (Xth Revision)
Arkhangel'sk	284082	0	0	0.1	0.01
Astrakhan	264374	0.09	2.9	3.7	4.71
Bessarabia	957133	.	53.3	2.1	1.04
Chernigov	1471866	56.7	48.9	44.9	37.61
Ekaterinoslav'	934139	27.6	38.8	39.3	33.09
Estliand	303478	84.6	85.7	0	0
Grodnno	881881	.	56.4	48.4	40.05
Iaroslavl'	976866	67.4	69.9	66.9	56.45
Kaluzha	1007471	80.3	76.6	69.0	57.14
Kazan	1543344	14.2	17.5	16.7	13.79
Khar'kov	1583571	52.5	45	34.3	29.75
Kherson	1114248	12.5	40.4	38.6	28.83
Kiev	1944334	.	81.2	68.8	57.66
Kostroma	1076988	68.2	66.8	65.4	57.31
Kovno	988557	.	.	42.9	36.89
Kurliand	754725	.	46.5	0	0
Kursk	1812035	54.8	41.2	46.4	38.67
Lifliand	897603	78	70.8	0	0
Minsk	987471	.	72.5	62.6	60.55
Mogilev	884640	.	75.3	70.7	64.63
Moscow	1599808	51.7	59.2	51.7	38.42
Nizhegorod	1259606	68	68	66.8	57.58
Novgorod	1134078	54.8	49.6	48.1	43.05
Olonets	287354	0.5	5.5	5.4	3.92
Orel	1532034	67.3	60.4	56.3	46.87
Orenburg	914308	1.4	12.4	13.8	2.66
Penza	1188528	59.2	57.2	53.5	45.92
Perm	2046481	53	44.8	30.9	18.64
Petersburg	1053975	33.6	37.5	53.5	24.23
Podol'sk	1748466	.	75.5	61.4	59.49
Poltava	1819110	44.4	45.7	41.6	37.47
Pskov	706462	68	70.3	60.3	53.81
Riazan	1427299	69.9	69.8	63.5	55.45
Samara	1530039	.	.	.	15.25
Saratov	1636135	9.9	.	42.4	40.19
Simbirsk	1140973	45.9	50.3	44.5	38.78
Smolensk	1102176	72.9	74	73.4	68.82
Tambov	1910454	43.1	43.7	47.7	39.00
Taurida	687343	.	0	6.6	5.97
Tul'a	1172249	.	76.6	75.4	68.53
Tver	1491427	.	59.1	57.9	50.63
Ufa	1597577	.	.	.	7.03
Viatka	2123934	2.3	2	2.6	1.74
Vilno	876116	.	44.4	52.2	45.60
Vitebsk	635021	.	65.3	63.6	57.06
Vladimir	1207908	64.5	63	62.6	56.99
Vologoda	960593	33.1	29.5	26.4	22.40
Volyna	1528328	.	77.7	64.0	56.53
Voronezh	1930859	21.8	36.4	35.2	26.79
Don Cossacks	945576	2.4	23.5	32.3	21.50
Totals / Means	59863023	51.7	64.7		36.39

Note: The overall means for the II, IV, and VIII Revisions include some serfs outside of European Russia. The sources are as in Table 1 for 1858, Kabuzan (2002) for 1745 and 1782, and Keppen (1857) for 1835.

Appendix Table 3 – Raw Correlations of Endowment Variables

		1	2	3	4	5	6	7
1	% Serf Population Share	1			Format:	Correlation Coefficient		
		495				Statistical significance		
2	Large Serf Estate	0.1184*	1			Observations		
	Size (Souls), 1850s	0.0233						
		367	367					
3	Mean Noble	-0.0366	0.7579*	1				
	Property, 1905	0.4171	0					
		494	367	500				
4	Mean Peasant HH	-0.4528*	0.0384	0.0971	1			
	Property, 1905	0	0.4636	0.0299				
		494	367	500	500			
5	Mean Peasant HH	-0.3839*	-0.0559	0.0551	0.779*	1		
	Allotment, 1905	0	0.2853	0.2189	0			
		494	367	500	500	500		
6	Gini Coefficient	0.3611*	0.0711	-0.1259*	-0.1994*	-0.175*	1	
	Private Land, 1905	0	0.1825	0.0057	0	0.0001		
		479	353	481	481	481	481	
7	Gini Coefficient	0.3134*	0.1379*	0.1859*	0.0004	0.1737*	0.2302*	1
	Private+Allotment	0	0.0098	0	0.9933	0.0001	0	
	Land, 1905	470	350	472	472	472	472	472

Note: See the text, Table 1, and Appendix Table 1 for additional detail on these variables and their sources. Each row entry (except #1) lists the correlation coefficient, the level of statistical significance, and the number of observations.