

The Impact of Feudalism on Long-Run Development in Russia

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Feudalism was the dominant system of land ownership throughout medieval Europe, yet little causal evidence of its effect on agricultural productivity, labor markets, and welfare exists. This paper attempts to fill this gap by studying one of the largest late medieval land reforms, the feudal *pomestie* reform in Russia. In 1478, the Grand Prince of Moscow Ivan III annexed the Republic of Novgorod. By ca. 1488, he expropriated most of the landed properties there. More than half of them were eventually granted to several thousand Muscovite military class people as fiefs. Using data from 1478–1500 tax cadasters (called *pistsovye knigi*), the paper shows that, compared to estates that remained under status quo (allodial or freehold tenure), properties that were feudalized by 1490 and granted to new proprietors experienced a sharp decline in levels of grain productivity and total grain yield by 1500. The study also demonstrates that feudalization caused outmigration of tenant households and workers from affected estates, and that feudalized estates generated lower per capita incomes by 1576/77, had higher incidence of sharecropping and lower levels of commercialized handicrafts by 1790.

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1 Introduction

Feudal and allodial titles were the two most common customary forms of land ownership in Europe between the 9th and late-18th centuries. Allodial tenure is a type of real property ownership that is not tied to any rental payments, obligations, service, or acknowledgement to superior landlord or sovereign. In contrast, feudal tenure is a form of conditional ownership of land or other income-generating real properties that is granted in exchange for military or civil service rendered by the holder of the fief. Feudal title was the predominant form of land ownership across Western and Central Europe and post-Conquest England, while allodial titles were more common throughout Scandinavia, Eastern Europe, South Germany, and the Netherlands ([Reynolds, 1994](#)). In Rus' before the late 15th century, most lands were held as allods by appanage princes and aristocrats, monasterial corporations and ecclesiastical hierarchs. Tenancy on such lands usually involved being part of a commune that collectively made decisions regarding allocation of land across crops and use of common properties such as pastures, forests, meadows, water sources, mills, etc. ([Danilova, 1955](#); [Shapiro, 1987](#); [Stepanova, 2004](#)). During the late 15th through 17th centuries, rural population of Eastern Europe had experienced an unprecedentedly rapid rise of unfree labor arrangements and coercive tenancy contracts. Throughout the region, these developments were accompanied by the general decline of large, independent aristocratic and appanage allodial tenure—usually characterized by absentee ownership, fixed-rate tenant obligations, and non-interference in peasants' communal affairs—and its eventual replacement by a classic feudal system where large allodial estates belonging to the sovereign and ecclesiastical entities coexisted with smaller parcels of land granted as fiefs to burgeoning professional military class. The Price Revolution, the shift from luxury to bulk goods such as grain, tallow, and timber in the East-West European trade, and growing fiscal needs of central authorities precipitated a radical change in land ownership landscape and organizational form of agricultural production. This, ultimately, resulted in steadfast tightening of peasants' labor market conditions and deterioration of their property and communal decision-making rights.

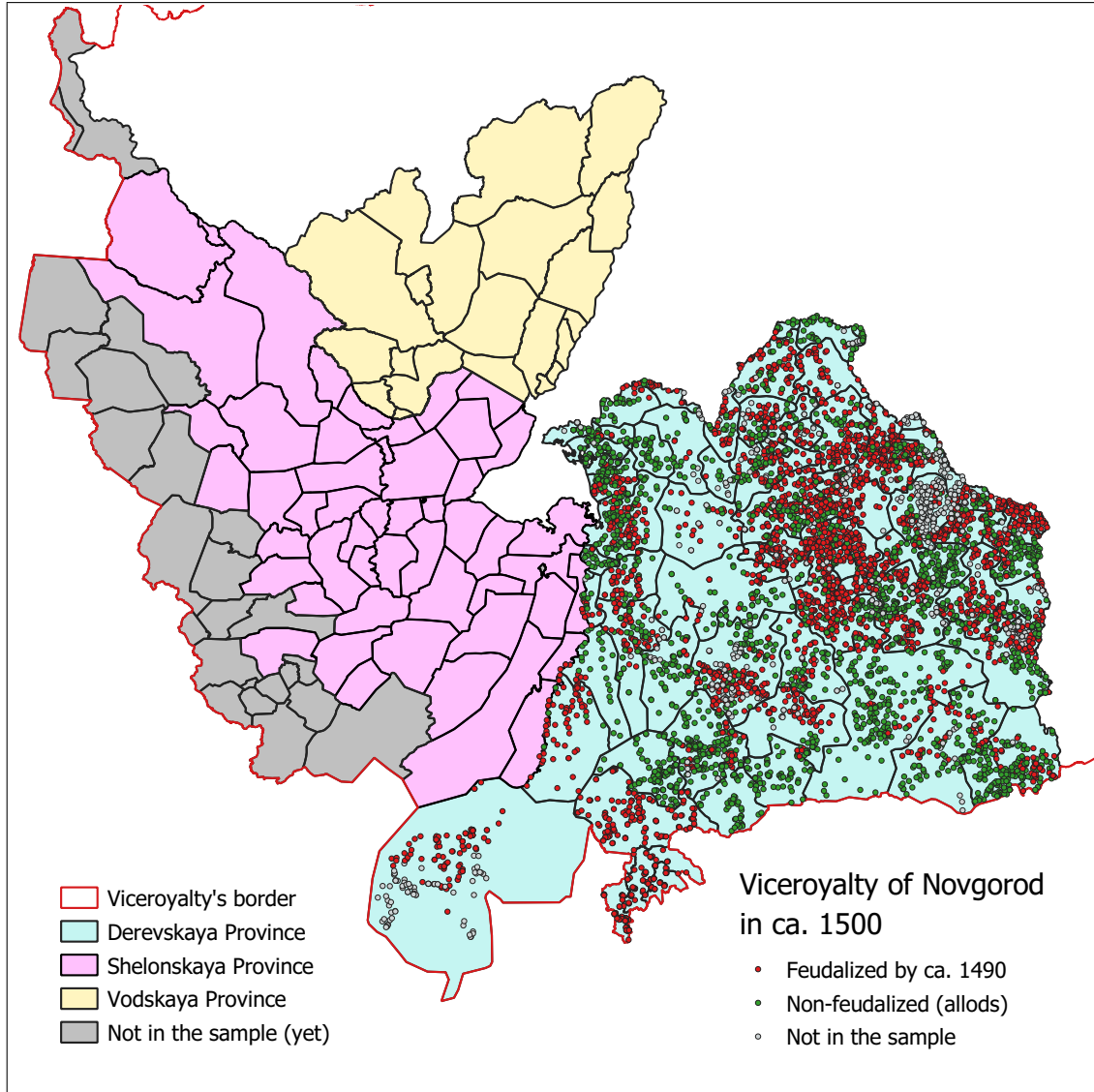
There are several channels through which feudalization might have negatively affected productivity and welfare. Holders of allodial tenure were frequently urban merchants or held public offices elsewhere, meaning that their cost of labor and land management were relatively high. In contrast, holders of fiefs were oftentimes professional servingmen obliged to provide service to their lords. They rarely held public office and were often required to reside in close proximity to their holdings ([Emigh, 1997](#)). Consequently, lower cost of supervising the fiefs vis-à-vis allodial estates translated into differences in tenancy contracts: tenancy on feudal lands usually entailed higher share of raw labor obligations and sharecropping ([Aston](#)

& Philpin, 1987). In contrast, by committing to fixed-rent tenancy contracts, allodiaries made their tenants more of the residual claimants of their effort, which, in theory, may have increased both equity and efficiency (e.g., Sen, 1966; Bonin et al., 1993). Additionally, giving peasants ownership stakes and delegating decision-making to the commune as it was commonly practiced by the owners of allodial estates may have been beneficial in terms of incentive and equity effects (Kandel & Lazear, 1992). Overall, feudalization may have had adverse impact on productivity and welfare because it restricted decision-making rights of the peasant commune and replaced it with direct oversight by the landlord.

Extreme forms of labor-coercive arrangements typical for feudal regimes, such as slavery and serfdom, deservedly received a lot of scholarly attention. Traditionally, the literature has been focusing on two questions: what are the causes of labor coercion and what is the impact of labor-coercive arrangements on productivity, economic growth, and welfare. Many recent studies show that abolition of customary forms of land tenure linked to restrictions of peasants' rights and mobility significantly improved efficiency of agriculture (e.g., Markevich & Zhuravskaya, 2018; Bugge & Nafziger, 2021), fixed misallocation of factors of production (Acemoglu & Wolitzky, 2011; Acemoglu et al., 2012; Ogilvie, 2013), and spurred innovation and industrialisation (Markevich & Zhuravskaya, 2018; Heldring et al., 2021). A lot of attention has been devoted to examining the long-run impact of restrictive forms of land tenure on subsequent economic outcomes, particularly in case of bungled implementation—or outright absence—of post-emancipation reforms defining and securing property rights of workers and the smallholder class (see, for example, Nunn, 2008a; Nunn, 2008b; Miller, 2009; Nunn & Wantchekon, 2011; Acemoglu et al., 2012; Bertocchi & Dimico, 2014; Nafziger, 2016). However, despite a rich theoretical literature on agricultural tenancy contracts typical for feudalism, there are still no clear-cut causal evidence for the impact of feudal tenure on efficiency, specialization, and equity dating back to the onset of feudalization, when certain aspects of direct ownership associated with feudal tenure may have had smaller or even opposite effect than the one documented by the studies of emancipation reforms.

This paper fills this gap by examining, perhaps, the largest late medieval and early modern feudal land reform, the *pomestie* reform in Russia. In 1478, the Grand Principality of Moscow annexed the Republic of Novgorod—one of the largest territorial-state formations of medieval Rus' with the city of Novgorod being the birthplace of Rus' statehood—thus ending more than 340 years of republican government. Before the fall of the Republic, most of its core lands were owned as allods by some 1400 aristocrats (*boyars*) and privileged citizens (*zhitii lyudi*), the archbishop, around 600 monasteries and churches, and several thousand smaller freeholders (*zemtsy* or *svoezemtsy*). Upon conducting the first comprehensive tax survey in ca. 1482, the then-Grand Prince of Moscow, realized his inability to exercise

Figure 1: Settlements and parish boundaries from 1478–1500 tax cadasters



Note: The map depicts all parish (lower-level administrative units) and geocoded settlements for which I currently have estate- and village-level data. All estates from Derevskaya province (in *turquoise*) have been geocoded and enter the sample with full set of measured geographical confounders. Estates from shaded *pogosts* of Shelonskaya (in *pink*) and Vodskaya (in *yellow*) province were not yet geocoded, so they only have tax cadaster data available, which explain the difference in the number of observations between regression specifications that include geographical confounders and those that don't.

control and organize direct taxation in this remote territory. Despite his initial promise not to take away allodial estates in the former Republic, between late 1470s and ca. 1484 he expropriated most private allodial lands belonging to former Republic's elites, as well as

some lands owned by the archbishop and monasteries. By circa 1490, around 65% of these expropriated estates were partitioned into smaller parcels of 20-38 standardized tax units and granted as fiefs (pl. *pomestiya*) to several thousand newly enlisted Muscovite servingmen and their families conditional on providing life-long military service. The new proprietors of these lands were given full control over peasant communes—including ownership of communal properties like forests, mills, etc.—and were allowed to renegotiate old tenancy contracts. The rest of the lands were either expropriated and kept on the Grand Prince’s balance as tax-paying (*obrochnye*) and palace (*dvortsovye*) lands, or remained under old landowners—with communal institutions and old tenancy contracts intact in both cases. Around late 1490s–early 1500s, concerned about self-sustainability of the new feudal system, Ivan commissions the second wave of tax survey which followed exactly the same program.

To study the effect of feudalization on agricultural productivity and labor markets, I digitize all surviving 1478–1500 tax cadasters (traditionally called *pistsovye knigi*) and the 1558 auxiliary tax payment book, which together cover most core southern territories of the former Republic both before and after the feudalization campaign. For now, I only use estate-level data from the most densely-populated Derevskaya province, parts of Shelonskaya and Vodskaya provinces, and difference-in-differences research design to show that, compared to estates which retained communal institutions and old tenancy contracts under status quo allodial tenure, properties that were feudalized by circa 1490 experienced a sharp 21–22% decline in grain productivity (measured as the ratio of total grain yield to amount of seeds used), a 7–7.2% decline in total grain yield between ca. 1478 and ca. 1500, and an 11% decline in 1500–1558, and, finally, a 5.2–7.4% increase in total grain yield per adult man between ca. 1482 and 1500. These results are in line with [Kolmogorov \(1922/1994\)](#), who in his study of tax cadasters of Shelonskaya Province makes a conjecture that in response to increased oversight, tenant households on newly feudalized lands may have partially switched to less efficient female labor in grain production, while some men from these households have either found work or took upon tenancy on allodial estates, or increased their specialization in husbandry and other productive activities such as fishing, hunting, honey harvesting, and crafts that were harder for the landlords to observe and tax.

In 1497, Ivan III promulgated the new legal code (*Sudebnik*), which for the first time established universal rules for peasants who wanted to leave their landlord. The infamous article 57 of *Sudebnik* allowed eligible tenants to switch landlords only during the two-week window around St. George’s Day on November 26 and introduced a monetary exit fee varying from 54 *dengas* to one *ruble* (=216 *dengas*, which could buy a horse in late 15th century Novgorod) depending on the duration of tenancy prior to exit. A number of historians including [Rozhkov \(1899\)](#), [Samokvasov \(1904\)](#), [Yanitskiy \(1915\)](#), [Gnevushev](#)

(1915), Danilova (1955), Bernadskiy (1961), Shapiro (1987), and others argue that it was the creation of *pomestie* system that prompted Ivan’s government—which was concerned with solvency and sustainability of newly feudalized estates—to impose restrictions on peasants’ mobility. So far, however, the evidence presented in support of this hypothesis have been anecdotal (Frolov, 2017). Using difference-in-differences design I show that feudalized estates indeed experienced a stark decline in tenant population compared to properties that remained under allodial tenure. Between circa 1482 and 1500, feudalization caused a 10% decline in the number of tenant households and a 13.8-15.1% decline in adult male population, which includes tenants themselves, their male dependants and relatives, farmhands and subtenants, and slaves. Finally, feudalization is associated with a 4-5.2% reduction in the number of adult men per tenant household, a result which is also in line with Kolmogorov’s (1922/1994) conjecture discussed above. I interpret these findings as suggestive evidence in favor of causal link between feudalism and restrictions on labor mobility.

To investigate the impact of feudalization on long-run development, I digitize two additional sources. The first one is the 1576/77 survey of Archbishop of Novgorod’s finances that provides independent assessment of total tax income for many estates. The caveat is that it only provides measures of collected church tax (*tithe*) for estates where the church *decided* to collect the tax, which means that the selection of churches into my sample is not random¹. I therefore estimate the Heckman selection model using distance from estate to its designated church² as an additional source of exogenous variation. Treating selection into feudalization as exogenous for now, I find that feudalization by 1490 is associated with 13% lower per capita tax generating potential in 1576/77.

Next, I digitize the entire corpus of the General Land Survey materials from 1780s-1800 which cover the Republic’s territory. In particular, I digitize and georeference accompanying parcel-level cadastral maps for the entire St. Petersburg and Olonets provinces, as well as parts of Novgorod, Tver, Pskov and Arkhangelsk provinces. I also digitize the entire corpus of so-called *economic commentaries* accompanying those cadastral maps, and match parcel-level data from the commentaries to vectorized maps. For now, I only collected three main variables from the commentaries: total population, whether peasants were in sharecropping or fixed rent regime, and whether peasants were involved in any kind of off-farm commercialized handicraft. I then proceed to match ca. 1500 estates of Derevskaya province to ca. 1790

¹Note that when the church decides to tax a particular estate with its 10% *tithe* tax, there will only be a partial summation with other taxes. Essentially, most of the tax will be passed through to the state, so that a portion of taxes collected by the state from this estate will be earmarked to cover the tithe tax. Therefore, the tithe tax doesn’t change the overall tax burden of an estate, only its composition.

²Think of it as of proxy for the cost of tithe tax collection from a particular estate from the point of view of the church.

parcels of the General Land Survey and end up with 1490 observations, which corresponds to the number of estates in Derevskaya province for which we have both the ca. 1482 and ca. 1500 data available. Estimates from a simple difference-in-differences model with county-, province- and old landowner fixed effects and a battery of geographical controls shows that feudalization by ca. 1490 is associated with 12% higher share of peasants on sharecropping contracts, and 11% lower rate of engagement in off-farm commercialized handicraft or proto-industrial production. The results are in line with wider literature suggesting that feudal regimes hindered efficient allocation of factors of production and, therefore, curbed the development of industrial production.

The main empirical challenge when studying the effect of land tenure is that property rights are not randomly assigned. In the context of the *pomestie* reform, the choice of whether to expropriate a particular estate or not—and if yes, whether to keep it as allod or convert it to fief—may have been made based on estate’s underlying characteristics, such as geography, professional and ethnic composition of its tenants, etc. These characteristics may also affect outcomes of interest. To alleviate the concern of possible endogeneity of feudalization assignment, I use combined difference-in-differences and instrumental variable design. Between October 1475 and January 1476, Grand Prince Ivan III travelled to the city of Novgorod. During his stay there he visited homes of prominent republican officials and forced them to finance a number of weeks-long feasts for him, his retinue and guards, and city’s common people. On top of that, he ordered all aristocrats, privileged citizens, and other big landowners to pledge their full and unconditional obedience to the Grand Prince. A number of people who previously supported an alliance with Grand Duke of Lithuania and King of Poland Casimir IV against Muscovy—around 40 individuals identified by Abramovich (1975) from the chronicles—refused to do so. In the next several years, most of these people were arrested, executed, or banished. In 1477, in exchange for his promise to not expropriate private estates of loyal allodiaries, Ivan demanded handover of all estate that belonged to those 40 dissenters, as well as half of all lands owned by the archbishop, monasteries, and churches. According to the chronicles, in circa 1478 he issued a proclamation promising that lands belonging to small freeholders (*svozemtsy*) will not be expropriated. He also ordered that all lands taken from the archbishop, ecclesiastical entities, and those 40 dissenters were to be kept on his own balance, thus retaining their old communal customs and institutions (*The Complete Collection of Russian Chronicles*, vol. XXV, pp. 308-322). The importance of these proclamations for my empirical design is that they were issued *before* the abolition of the Republic and *before* the new Muscovite administration began its first comprehensive land survey in the early 1480s. Therefore, I argue that estates’ status as designated allod in circa 1478—that is, an indicator variable

equal to 1 if an estate belonged to the archbishop, a monastery, a church, a freeholder, or one of the 40 dissenters *before* Ivan’s government even came up with the *pomestie* reform idea—can be used as an instrument for estates’ feudalization status in circa 1490. As expected, I find that designated allod status in circa 1478 is negatively and significantly correlated with fief status in circa 1490: in Derevskaya Province, only 7% of fiefs were previously labeled as designated allods, compared to almost 80% of estates that remained under allodial tenure by 1500. I find that 2SLS-IV estimates of causal effect of feudalization are identical to the baseline OLS estimates in terms of both the magnitude and statistical significance for all outcomes of interest. The IV estimates of the long-run effects of feudalism are also in line with naive difference-in-differences and Heckman selection model estimates.

This paper contributes to several venues of research. First, it contributes to the literature that examines the costs and benefits of communal property rights system vis-à-vis direct ownership (see [Bonin et al., 1993](#) and [Pencavel, 2013](#) for reviews). Second, the paper is related to the literature that attempts to understand the impact of land reforms and land property rights. [Besley & Burgess \(2000\)](#) study land reforms in India and find that tenancy reforms are associated with steady reduction in rural poverty. In the similar fashion, [Banerjee et al. \(2002\)](#) examine tenancy reform in West Bengal and demonstrate that tenancy reforms had significant impact on agricultural productivity. Even though at the moment I am unable to disentangle the effect of abolition of communal institutions from the effect of deterioration in tenancy contracts, I show that combined effect on productivity, yield, and labor markets was negative. Finally, I am directly contributing to the literature which examines the link between restrictive customary land tenure and labor coercion which I discussed above.

2 Background and Data

I. ORIGINS OF LABOR COERCION IN EUROPE.—There are two main views on the origins of labor-coercive regimes in Europe. One focuses on domestic factors such as land-to-labor ratio and the value of peasants’ outside options, and another one explicitly incorporates changes in international market conditions. [Blum \(1957\)](#) argues that the rise of bargaining power of the landowning class leads to deterioration of labor market conditions—first for farmhands and, eventually, for the entire tenant class. Following this view, several studies have argued that, subsequently, the elites strategically relinquished coercive economic power in order to prevent social unrest ([Acemoglu & Robinson, 2000](#); [Aidt & Franck, 2015](#)). Another early attempt at rationalizing labor-coercive institutions has focuses on land-to-labor ratio. Low population density in parts of the Americas and Eastern Europe led [Domar \(1970\)](#) to argue that high cost of free labor in these regions created incentives for landowners to limit workers

mobility and support—politically or otherwise—an institutional system that facilitates such restrictions. This view has been criticized by [North & Thomas \(1973\)](#) and [Brenner \(1976\)](#) who argue that post-plague Western Europe had experienced both an increase in land-to-labor ratio and a decline of labor coercion. Additionally, [Brenner \(1976\)](#) highlights the role of local differences, such as ability of local urban labor markets to provide off-farm employment (i.e. the value of the outside option) and the strength of landed elites in defining the exact relationship between land-to-labor ratio and coercion. The model in [Acemoglu & Wolitzky \(2011\)](#) reconciles these two conflicting theories by showing that the rise of labor coercion could have two countervailing causes. On one hand, an increase in price of goods produced by coerced labor increases productivity of coercion, thus intensifying landlords’ incentive to coerce, which they call the “Domar effect.” On the other hand, an improvement in peasants’ outside option due to trade or technological advances reduces productivity of coercion, which might prompt the elites to voluntarily abandon historically profitable coercion in favor of employing free skilled workers (the “outside-option effect”). [Hellie \(1971\)](#) stresses the role of state capacity and argues that, in the context of late medieval and early modern Russia, enabling labor coercion and delegating taxation to emerging local military elites was the only way for the state to solve its defense externality problem. Finally, a number of Polish historians in 1950s-1970s (see [Malowist, 1958, 1959](#) and [Kaminski, 1975](#)) have argued that the rise of grain trade between Eastern and Western Europe was one of the main potential causes of the Second Serfdom, an account which is supported by more recent studies (see [Guzowski, 2011](#) and [Raster, 2019](#) for the summary of this debate).

II. BACKGROUND OF THE POMESTIE REFORM.—This paper contributes to the debate about origins and consequences of labor coercion in Europe by studying one of the largest land redistribution campaigns in late medieval and early modern Europe—the Russian *po-mestie* reform of the late 15th-17th centuries, which was initially launched in the former Republic of Novgorod following its annexation by the Grand Principality of Moscow in 1478. In early 1480s, Ivan III, the then-Grand Prince of Moscow, realized the need to further unify the Muscovite state after recent victory over and accession of Novgorod, which almost doubled the size of Muscovy. On one hand, the central government in Moscow—located more than three hundred and fifty miles from the city of Novgorod—found itself unable to tax the newly acquired population while old Novgorodian elites were still in charge. On the other hand, after two unsuccessful revolts in less than ten years following the annexation, the military command in Moscow understood that without a solid, loyal local presence its irregular troops located in the capital were unable to prevent Novgorodian independence movements from reasserting themselves. Ivan’s government solved the problem by expelling around 1400

families of Novgorodian aristocrats (*boyars*), privileged citizens (*zhitii lyudi*), and other large landowners—many of whom were eventually given estates, albeit much smaller, and civil or military offices in regions around Moscow—and confiscating 87.3% of all allodial estates in the former Republic. Most of these old estates—around 79% by late 1530s—were partitioned and granted to several thousand loyal middle service class gentry who held the ranks of courtier (*dvorianin*) or *boyar* scion (*syn boyarskiy*), and who were recruited from Moscow and other Muscovite provincial towns. Some estates along the border with Sweden and Livonian Order in northwestern Vodskaya and southwestern Shelonskaya Provinces were assigned to previously unfree servitors of exiled Novgorodian aristocrats. Although earlier Russian appanage dukes and princes would usually give out parts of their own ancestral lands to their servingmen in allodial tenure, Ivan’s government decided to grant these newly confiscated lands as life-long conditional fiefs (pl. *pomestiya*), where most dues paid by the tenants who cultivated the land were earmarked to support the new lord’s household and his military or civil service. The new landlords acquired the ownership of estate properties and fixtures that previously were managed collectively by the peasant communes, such as pastures, meadows, lakes and rivers, mills and warehouses, etc.— and were given the right to renegotiate old tenancy contracts upon assuming the tenure. The reform effectively destroyed traditional allodial landholding in the region—aside from several thousand of petty freeholders (*svoezemtsy*) and monasteries that were allowed by Ivan III to retain their landholdings in allodial tenure—and replaced it with a classic manorial regime, typical for medieval Western Europe but previously almost unknown in Eastern Europe.

The current iteration of this paper only focuses on the earlier period of *pomestie* system in Novgorod land in 1478-1500, yet the general setting of the reform has several advantages for studying feudalism. Specifically, it provides two crucial sources of variation to separately identify the impact of coercive agricultural contracts and mobility restrictions on productivity. First, the *pomestie* reform was staggered in nature: while most of the old allodial estates were confiscated between 1478 and circa 1484, the feudalization efforts likely continued well into the late 1530s. Parts of the old estates that were not granted as fiefs remained on Grand Prince’s balance and continued to pay the same or similar level of taxes and other obligations as they did under the old allodial tenure. These estates have also retained traditional communal institutions typical for allodial tenure during the period of independence. For feudalized estates, the new level and composition of feudal dues and obligations were determined only *after* a part of an old estate was granted to its new proprietor. The terms of new tenancy contracts were subject to bargaining between the peasant commune’s representatives (*tselovalniki*, or “cross-kissers”), the new landowner and his footmen (*kliuchniki*, or key-men), and the state surveyors. While the exact mechanism used by local and central administrations

to determine the order and timing of putting up land parcels for feudalization, as well as the determinants of feudalization assignment itself (that is, what estates got feudalized and why) is still the subject of an open debate, the fact that in Derevskaya Province—which is the focus of this paper for now—only 3 more estates became feudalized between 1500 and circa 1540 allows me to use a simple two group, two periods difference-in-differences design to estimate the causal effect of circa 1490 feudalization on agricultural productivity and labor markets. Second, the data from surviving tax cadasters covers three distinct periods in the history of labor mobility in Russia. Prior to 1497, there were no significant restrictions on mobility of peasants or farmworkers. Throughout the year, eligible tenants and farmhands were likely still planning their leaves in accordance with the harvesting cycle, so tenancy terminations before late November were rare. In 1497, Ivan promulgated the new legal code (*Sudebnik*) in all of Muscovy. The last part of the code contains its most famous provision, article 57, “On the Quitting-Time of Peasants” (*o krestianskom otkaze*), which allowed eligible peasants to move to another landowner only during one week before and after Saint George’s Day on November 26. It also imposed an exit fee with phased-in rate—the more years a tenant stayed with the landlord, the higher the rate—payable to the old landowner. The highest possible rate was 1 silver ruble, which was a little more than the price of a horse in late 15th century Novgorod. Finally, in 1580s, Tsar Ivan IV allegedly promulgated the so called “Forbidden Years” decree which temporarily paused peasants’ right to change landowners around Saint George’s Day. This right, however, was never restored and the ban on peasants’ mobility was finally officially codified by the Council Code (*Sobornoe Ulozhenie*) of 1649.

III. DESCRIPTION OF PRIMARY DATA SOURCES.—The new *pomestie* system altered traditional relationship between the state and its servingmen in Northeastern Rus’. The Muscovy’s growing need for additional servingmen to garrison its expanding southern and eastern frontiers and the network of fortifications in the west against Poles, Swedes, and Livonian Order necessitated the spread of the *pomestie* system throughout the country. The enfeoffment of thousands of *pomeshchiks* severed the remaining personal ties between the sovereign and his vassals, thus prompting the central government to start maintaining unified service records and tax cadasters. After the early 1480s, the Muscovite administration has been regularly conducting thorough surveys of all rural households and arable lands in the Viceroyalty of Novgorod to determine whether the *pomestie* system provided sufficient income for military or civil service (Samokvasov, 1904; Frolov, 2017). The final results of these surveys, as well as later adjustments made by the local officials, were compiled in handwritten cadastral books called *pistsovye knigi*. These cadasters include detailed information on

land ownership; village-level lists of household heads, their farmhands, male dependants, and slaves; measure of seeds used in sowing the allotted land and total expected yield (expressed in “taxable units” called *obzhas*), detailed breakdown of peasants’ seignorial dues (monetary and in-kind), labor obligations and outside employment, as well as yield-based taxes earmarked to finance local bureaucratic apparatus—the Viceroy’s office and Grand Prince’s envoys and clerks, judiciary, and postal system—called *kormlenie* (the “feeding fees”) and *obezhnye dani* (“*obzha*-based fees”); another yield-based tax which financed expenses not covered by the *kormlenie* tax—mainly maintenance of roads, bridges, religious and administrative buildings. Fortunately, most of the cadasters covering the first hundred years of *pomestie* system in the Viceroyalty of Novgorod—those conducted in the early 1480s before most expropriations, 1500, circa 1540 and circa 1550, circa 1568, and circa 1585—have survived. A number of cadasters from 1610-1628, including those conducted by local surveyors on behalf of Swedish occupational administration, which cover approximately 20% of former Republic’s territory have survived. I digitized all surviving Novgorodian cadasters from 1478 through 1628—thirteen volumes edited and published by [Savvaitov \(1859, 1862\)](#), [Savvaitov & Timofeev \(1868\)](#), [Timofeev \(1886\)](#), [Bogoyavlenskiy \(1905, 1910\)](#), [Trotskiy & Bogoyavlenskiy \(1915, index to the six previous volumes\)](#), [Baranov \(1999a, 1999b, 2001, 2004a, 2004b, 2009\)](#), a number of other publications, and 748 pages of unpublished archival material. This is the first time all of these data are being put together into one dataset.

In what follows, I describe the data from 1478-1500 cadastral books of Derevskaya province—the most densely-populated southeastern province of the Viceroyalty of Novgorod—and portions of Shelonskaya and Vodskaya provinces, which are going to be the focus of this paper. [Frolov \(2017\)](#) does an extensive historiographical, source critical, and prosopographical study of the original cadastral books from Derevsakaya province. The second Muscovite field survey in this province was conducted during an expedition headed by Prokofiy Skurat-Stanishchev, son of Zinoviy, and Petr Volk, son of Boris, in the winter of 1495 and the spring of 1496. It then took the Viceroy’s scribes several years to tabulate the data from the first survey from circa 1482, match all the villages from the first and the second surveys, compile the final cadastral book, and update the data for a handful of missing estates that, for various reasons, were not surveyed during the second expedition. Finally, in the winter of 1499, a copy of the book—which will later be destroyed in Moscow’s fire of 1626—was sent to the capital. Most of the 1478-1500 cadastral descriptions for Derevskaya province were published in [Savvaitov \(1859, 1862\)](#), with several fragments taken from [Baranov \(1999a\)](#).

Table 1: Descriptive statistics of estates by circa 1490 treatment status

		Feudalized by 1490 (Treatment)		Allod by 1490 (Control)		Unconditional		Conditional on 1478 County & Landowner FE	
	year	mean	s.d.	mean	s.d.	diff.	p-value	diff.	p-value
<i>Panel A: Raw data</i>									
Settlements	1482	8.54	11.89	8.21	17.23	0.33	0.34	-0.38	0.73
	1500	10.21	12.35	10.42	20.83	-0.21	0.42	-5.18	0.62
Tenant households	1482	17.24	18.21	18.91	55.28	-1.67	0.52	-19.67	0.42
	1500	19.35	23.16	23.49	67.13	-4.14	0.27	-24.73	0.40
Adult men	1482	17.29	21.56	21.32	71.35	-4.03	0.42	-34.58	0.35
	1500	19.67	23.93	25.43	79.34	-5.76	0.17	-31.93	0.39
Tax units	1482	19.28	20.15	21.45	61.03	-2.17	0.41	-28.15	0.40
	1500	19.14	20.54	23.01	70.14	-3.87	0.32	-25.36	0.42
Seeds used (×420 litres)	1482	37.14	38.12	42.61	129.17	-5.47	0.41	-45.49	0.38
	1500	45.02	44.86	46.19	134.21	-1.17	0.69	-41.14	0.58
<i>Panel B: Outcome variables</i>									
Grain productivity	1482	1.86	0.24	1.88	0.23	-0.01	0.90	-0.02	0.84
	1500	1.60	0.20	2.11	0.44	-0.51	0.00	-0.26	0.01
Grain yield	1482	77.12	80.41	85.67	248.32	-8.55	0.48	-89.31	0.41
	1500	76.55	82.12	91.98	280.56	-15.43	0.21	-92.15	0.43
Grain yield per adult man	1482	3.94	0.81	3.95	0.87	-0.01	0.62	-0.21	0.45
	1500	3.72	0.82	3.51	0.92	0.21	0.00	0.41	0.03
Grain yield per household	1482	4.35	0.87	4.29	1.13	0.04	0.76	-0.02	0.96
	1500	3.92	0.81	3.87	1.15	0.05	0.36	0.45	0.18
Adult men per household	1482	1.11	0.19	1.11	0.25	0.00	0.75	0.02	0.69
	1500	1.05	0.13	1.13	0.21	-0.08	0.00	-0.05	0.35
Num. of observations		1192		862					
<i>Panel C: Controls</i>									
Avg pre-1500 CSI	-	1808.13	59.91	1814.34	60.93	-6.21	0.09	-15.16	0.21
Avg dist. to Novgorod, km	-	119.15	40.15	115.92	50.17	3.23	0.11	21.45	0.09
Num. of observations		870		620					

Note: **Panel A** reports descriptive estate characteristics as they appear in 1478–1500 cadastral book of Derevskaya province and portions of Shelonskaya and Vodskaya provinces, separately for feudalized estates (treatment group) and non-feudalized estates (control group) in circa 1482 and 1500. *Settlements* is the total estate-level number of non-abandoned rural settlement units, which includes villages (*selo* and *seltso*, usually with permanent chapel or church), hamlets (*derevnya*), homesteads (*pochinok* and *zaimishche*), and merchant/artisanal colonies (*ryad* and *ryadok*). *Tenant households* is the number of non-abandoned tenant households. A household is defined as an extended family or several families—not necessarily related by blood—residing in one or several dwellings which have a common backyard (*dvor*). *Adult men* is the number of adult men residing on estate’s lands, which includes tenants and their male relatives and dependants, farmhands and subtenants, as well as tenants’ and landlord’s slaves. Landlords and male members of their family are excluded from the count. *Tax units* is assessment of potential grain yield by the state surveyors, which was used as a base for state taxes. Each tax unit (*obzha*) equals to 4 *korobyas*, a measure of grain which approximately equals to 420 litres. *Seeds used* is the amount of seeds used, expressed in rye-equivalent *korobyas*. **Panel B** reports the main outcome variables. *Grain productivity* is calculated as the ratio of grain yield ($4 \times$ tax units) to seeds used. **Panel C** reports instrumental variable and two control variables. *Designated allod in 1478* is an instrumental dummy variable which equals to 1 if an estate belonged to the archbishop, a monastery, a church, a freeholder, or one of the 40 dissenters who refused to pledge allegiance to Ivan III in 1475/76. Control variables are computed using location of 8858 geocoded settlements for estates with at least one geocoded settlement. *Average pre-1500 CSI* is an average pre-1500 Caloric Suitability Index from [Galor & Özak \(2016\)](#) which captures the variation in potential crop yield. Conditional difference is estimated controlling for parish and old landowner fixed effects with s.e. clustered at the estate level.

IV. RAW DATA.—Taken together, the 1478-1500 cadasters of Derevskaya Province contain descriptions of 9899 settlements allocated across 1490 estates. An estate is defined as a part of republican-era, usually larger allodial estate which by 1500 belonged to a new or an old owner. For example, if an old estate was partitioned into two, with one part being enfeoffed to a new proprietor and another one being kept by the old owner, then the two parts would be recorded as separate estates.

Panel A of Table 1 reports raw variables found in cadastral descriptions of estates in Derevskaya, Shelonskaya and Vodskaya province for which both circa 1482 and 1500 data are available. For each of the 1898 (out of 2267 in the sample) estates with *some* estate-level data, I check if village-level data survived as well. If either the circa 1482 or 1500 estate-level data are missing, I tabulate the village-level data following the same rules original scribes used for the estate-level summaries. In particular, I exclude landlords and male members of their family from the total count of adult men. I also exclude empty tenant households and empty tax units (that is, vacant dwellings and deserted lands that were not cultivated by anyone) from the total count of tenant households and tax units, respectively. The resulting sample is a strongly-balanced panel of 2054 estates over two periods, circa 1482 and 1500, of which 1490 belong to Derevskaya province. Columns 2 and 3 report the mean and the standard deviation of each variable for the treatment group—that is, estates that were feudalized at some point between circa 1482 and 1500. Columns 4 and 5 report the mean and the standard deviation of each variable for the control group—estates that were not expropriated and remained under old landowners and those that were taken away but by 1500 were kept on Grand Prince’s balance, thus retaining old communal institutions and, for the most part, tenancy contracts in both cases. *Settlements* is the total estate-level number of non-abandoned rural settlements, which includes villages (*selo* and *seltso*, usually with permanent chapel or church), hamlets (*derevnya*), homesteads (*pochinok* and *zaimishche*), and merchant/artisanal colonies (*ryad* and *ryadok*). *Tenant households* is the number of non-abandoned tenant households. A household is defined as an extended family or several families—not necessarily related by blood, but always involved in productive activities together—residing in one or several dwellings with a common backyard (*dvor*). *Adult men* is the number of adult men residing on estate’s lands, which includes tenants and their male relatives and dependants, farmhands and subtenants, as well as tenants’ and landlord’s slaves. Landlords and male members of their family are excluded from the count. *Tax units* is assessment of potential grain yield by the state surveyors, which was used as a base for state taxes. Following the consensus among historians (see [Kolmogorov, 1922/1994](#); [Abramovich, 1963](#); [Abramovich, 1975](#); [Stepanova, 2004](#); [Frolov, 2017](#)), I assume that each tax unit (*obzha*) equals to 4 *korobyas*, a traditional medieval north Russian measure of grain

which approximately equals to 420 litres. I use this formula to compute total grain yield. *Seeds used* is the amount of seeds used, expressed in rye-equivalent *korobyas*. Columns 6 and 7 report a simple t-test of differences between the means of both groups. I find no statistically significant differences in either of the raw variables between the treatment and controls groups, in both circa 1482 and 1500. Finally, columns 8 and 9 report a difference in means conditional on parish and old landlord fixed effects and the p-value calculated using standard errors clustered at the estate level, respectively. For all of the raw variables across both periods, I fail to reject the null of zero difference in means between treatment and control groups.

V. OUTCOME VARIABLES.—Using the raw data reported in the cadasters, I calculate five main outcome variables of interest. The first one is *grain productivity*, which is calculated as the ratio of total *grain yield*—which, as I noted earlier, equals to 4 times the number of reported tax units—to the number of measures of seeds used. The next two outcomes of interest are measures of per capita and per household grain production. Only adult men who appear in the cadasters (excluding landlords themselves and male members of their family) are used in calculating the per capita yield. Also, only non-vacant tenant households are used in calculating the per household yield (that is, empty dwellings and households of landlords, clergy, and royal stewards are excluded from the final count). To test the [Kolmogorov \(1922/1994\)](#) conjecture about the change in household specialization and allocation of male labor, I also calculate the number of adult men per tenant household. Panel B reports means and standard deviations of all five of these variables across treatment and control groups in each year. One thing to note here is that there are statistically significant differences in mean grain productivity and grain yield per adult man in 1500, but not in 1482. To study the long-run effects of feudalism, I collect data on estate-level population and tithe tax collected in 1576/77 by the Archbishop of Novgorod from Ankudinov and Frolov (2011). Finally, I also digitize and georeference accompanying parcel-level cadastral maps for the entire St. Petersburg and Olonets provinces, as well as parts of Novgorod, Tver, Pskov and Arkhangelsk provinces³. I digitize the entire corpus of so-called *economic commentaries* accompanying those cadastral maps and match parcel-level data from the commentaries to vectorized maps. For now, I only collected three main variables from the commentaries: total population, whether peasants were in sharecropping or fixed rent regime, and whether peasants were involved in any kind of off-farm commercialized handicraft. I then proceed

³Novgorod: RGADA, f. 1356, op. 1, dd. 3003-3010 (Borovich), 3022-3029 (Valdai), 3044-3050 (Kirillov), 3061-3070 (Krestsy), 3084-3094 (Novgorod), 3109-3115 (Staraya Rusa), 3127-3140 (Tikhvin), 3145-3154 (Ustyuzhna Zheleznopolskaya); St. Petersburg: RGADA, f. 1356, op. 1, dd. 4581-4585 (Gdov), 4589-4595 (Luga), 4598-4606 (Novaya Ladoga), 4617 (Peterhof), 4621-4622 (St. Petersburg), 4623 (Tsarskoe Selo), 4626-4627 (Shlisselburg), 4630a (Yamburg);

to match ca. 1500 estates of Derevskaya province to ca. 1790 parcels of the General Land Survey and end up with 1490 observations, which corresponds to the number of estates in Derevskaya province for which we have both the ca. 1482 and ca. 1500 data available.

VI. INSTRUMENT AND CONTROL VARIABLES.—Panel C of Table 1 reports means and standard deviations of two control variables—average distance to Novgorod and pre-1500 Caloric Suitability Index (CSI)—and the instrument variable. In circa 1477, a year before the final annexation of the Republic, Ivan III issued a proclamation in which he promised not to take away private allodial estates of those Novgorodian landowners who pledged their allegiance during Ivan’s visit to the city 1.5 years earlier. In exchange for this promise, Ivan demanded handover of all estate that belonged to 40 people who refused to pledge their allegiance, as well as half of all lands owned by the archbishop, monasteries, and churches. Shortly after the final takeover, Ivan issued another instruction—this time addressing his Novgorodian representatives in private—saying that under no circumstances lands of small freeholders (*svoezemtsy*) should be taken away and that all lands expropriated from the archbishop, monasteries and churches, and the 40 dissenters should be allowed to keep their old communal institutions and roughly the same tenancy contracts. The important thing about these two orders/decrees/proclamations is that both of them were made way before the new Muscovite administration began surveying its newly acquired lands, which means that the decision to permit an estate to keep its republican-era allodial tenure was made *before* Ivan or anyone else in his administration could observe profitability of this estate. Moreover, the decision to designate an estate as allod in 1478 would only affect estate’s productivity and population through it’s *actual* feudalization status, unless tenants anticipated the consequences of feudalization and adjusted their choices accordingly. I discuss the plausibility of this assumption in the next section. To codify estate’s status as designated allod, I construct a dummy variable which equals to 1 if an estates belonged to the archbishop, a monastery, a church, a freeholder or a group of freeholders, or one or several of the 40 dissenting landowners who are mentioned in chronicles as arrested, executed, or banished (see [Abramovich, 1975](#) and *The Complete Collection of Russian Chronicles*, vol. XXV, pp. 308–322). Panel C in Table 1 shows that only 7% of feudalized estates were previously designated as allods but were converted to fief regardless. In contrast, almost 80% of properties which remained under allodial tenure by 1500 were selected into keeping allodial tenure back in 1478. Throughout the paper, I am using two main control variables. The first one is the average pre-1500 Caloric Suitability Index constructed by [Galor & Özak \(2016\)](#) which measures average *potential* yield using a combination of crops available before the Columbian exchange and pre-1500 technologies. I use this variable to account for heterogeneity in crop

suitability across estates. Finally, I calculate average unweighted distance between an estate and the city of Novgorod. The purpose of this variable is to capture the variation in off-farm employment opportunities for the tenants and members of their household. Both variables could only be calculated for estates with at least one geocoded settlement—there are 1490 such estates. Omitting non-geocoded estates does not bias my sample: I find no statistically significant differences in means of any outcome variables or controls between geocoded and non-geocoded estates within the same feudalization status and year. Panels A and B of Table 1 would yield the same picture if calculated over these 1490 geocoded estates only.

3 Empirical Design

I. BASELINE SPECIFICATION.—The *pomestie* reform provides a natural experiment to examine the extent to which feudalization of landed properties affected agricultural productivity and labor markets. To study the average effect of feudalization, I estimate the following difference-in-differences specification:

$$\log y_{it} = \alpha + \tau \text{Feudalized}_i \times \text{Post}_t + \beta \text{Feudalized}_i + \gamma \text{Post}_t + \mathbf{X}_i^T \psi + \varepsilon_{it}, \quad (1)$$

where y_{it} is an outcome for estate i in year $t = \{1482, 1500\}$. *Feudalized* is a dummy variable denoting estate’s feudalization status by circa 1490. *Post* denotes a dummy indicating the time after the feudalization campaign, that is, this dummy switches on in 1500. \mathbf{X}_i is a vector of time-invariant estate-level characteristics. *Fief* \times *Post* is the interaction between the treatment status and post-feudalization dummy. Finally, ε_{it} is the error term, which is clustered at the estate level, corresponding to the level of the identifying variation. All results, however, are robust to clustering at the old landowner level.

The interaction between the feudalization status and post-feudalization dummy, which I refer to as *Feudalized* \times *Post*, is the treatment variable of interest. The coefficient on this interaction τ is the difference-in-differences estimator of the effect of feudalization on the considered outcome. It estimates the average treatment effect on the treated (ATT) as long as the parallel trends assumption is satisfied. One thing to note here is that the data from circa 1482 should be interpreted as an average between the data from republican-era private surveys from circa 1478 and the data collected by the Muscovite centralized survey of the early 1480s. [Frolov \(2017\)](#) provides extensive evidence in favor of this claim. Therefore, we could interpret the fact that there are no differences in raw variables and main outcomes between feudalized and non-feudalized estates *before* feudalization, in circa 1482 (see Table 1), as suggestive evidence in favor of the lack of pre-trends. Across all specifications, I

Table 2: The Effect of Feudalization on Grain Productivity and Yield

<i>Dep. var.:</i>	log Grain Productivity		log Grain Yield		log Grain Yield	log Grain Yield Per Man	
<i>Period:</i>	1482 & 1500		1482 & 1500		1482 & 1558	1482 & 1500	
<i>Model:</i>	DiD (1)	DiD (2)	DiD (3)	DiD (4)	DiD (5)	DiD (6)	DiD (7)
Feudalized by 1490 (yes/no)	0.02 (0.02)	0.04 (0.03)	0.23 (0.22)	0.12 (0.22)	0.10 (0.21)	-0.00 (0.02)	-0.02 (0.03)
_____ \times Post-Reform	-0.21*** (0.02)	-0.22*** (0.03)	-0.09*** (0.03)	-0.07*** (0.03)	-0.11*** (0.04)	0.05*** (0.02)	0.07*** (0.02)
<i>Fixed Effects:</i>							
Post-Reform FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1478 County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1482 Province FE	Yes	Yes	Yes	Yes		Yes	Yes
1478 Landowner FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Controls:</i>							
Avg pre-1500 CSI		Yes		Yes	Yes		Yes
Avg distance to rivers		Yes		Yes	Yes		Yes
Avg distance to Novgorod		Yes		Yes	Yes		Yes
Avg min distance to kurgans		Yes		Yes	Yes		Yes
_____ \times Post-Reform		Yes		Yes	Yes		Yes
# of 1482 Provinces	3	3	3	3	1	3	3
Observations	4108	2980	4108	2980	1278	4108	2980
Unit of observation	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year

Note: The table reports OLS estimates of the effect of feudalization on grain productivity, measures of grain yield, and population. Unit of observation is estate-year. *Feudalized by 1490 (yes/no)* is a dummy variable which equals to 1 if estate i was feudalized at some point between circa 1482 and 1500. *Grain Yield* equals to $4 \times$ tax units. *Grain productivity* is calculated as the ratio of grain yield to seeds used. *Yield Per Man* is grain yield per adult male resident. *Average pre-1500 CSI* is an average pre-1500 Caloric Suitability Index from Galor & Özak (2016) which captures the variation in potential crop yield. Standard errors are clustered at the estate level.

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

control for both parish and old landowner fixed effects. These absorb all unobserved parish- and allodary-specific heterogeneity that could be correlated with feudalization status, for example that estates in better connected parishes were less likely to be feudalized because it would be easier to organize direct taxation via royal stewards there, or that certain old landlords had weaker communal institutions on their estates thus making it easier to switch to direct oversight under feudal tenure. Therefore, the identification is driven by feudalized estates located within the same parish and belonging to the same old landlord with other non-feudalized estates. Finally, I also control for two plausible estate-level time-invariant confounders that might have affected its feudalization status or outcomes directly. The first one is the average pre-1500 Caloric Suitability Index (CSI) constructed by Galor & Özak (2016), which captures the variation in average *potential* crop yield given the set of crops and technologies available prior to 1500. The second one is the average distance to Novgorod calculated as unweighted average distance across all geocoded settlements for estates with at least one geocoded settlement, which captures the degree of estate's connectedness to non-farm labor markets and the markets for grain.

Table 3: The Effect of Feudalization on Population

<i>Dep. var.:</i> <i>Period:</i> <i>Model:</i>	log Settlements		log Tenant Households		log Adult Men		log Adult Men Per HH	
	1482 & 1500		1482 & 1500		1482 & 1500		1482 & 1500	
	DiD (1)	DiD (2)	DiD (3)	DiD (4)	DiD (5)	DiD (6)	DiD (7)	DiD (8)
Feudalized by 1490 (yes/no)	0.26 (0.22)	0.24 (0.24)	0.14 (0.22)	0.22 (0.22)	0.27 (0.22)	0.17 (0.23)	0.02 (0.03)	0.02 (0.03)
_____ × Post-Reform	-0.02** (0.01)	-0.02** (0.01)	-0.10*** (0.03)	-0.10*** (0.03)	-0.14*** (0.02)	-0.15*** (0.02)	-0.05*** (0.01)	-0.04*** (0.01)
<i>Fixed Effects:</i>								
Post-Reform FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1478 County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1482 Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1478 Landowner FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Controls:</i>								
Avg pre-1500 CSI		Yes		Yes		Yes		Yes
Avg distance to rivers		Yes		Yes		Yes		Yes
Avg distance to Novgorod		Yes		Yes		Yes		Yes
Avg min distance to kurgans		Yes		Yes		Yes		Yes
_____ × Post-Reform		Yes		Yes		Yes		Yes
# of 1482 Provinces	3	3	3	3	3	3	3	3
Observations	4108	2980	4108	2980	4108	2980	4108	2980
Unit of observation	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year

Note: Table 3 reports OLS estimates for a number of population-related outcomes. *Settlements* is the total estate-level number of non-abandoned rural settlements, which includes villages (*selo* and *seltso*, usually with permanent chapel or church), hamlets (*derevnya*), homesteads (*pochinok* and *zaimishche*), and merchant/artisanal colonies (*ryad* and *ryadok*). *Tenant households* is the number of non-abandoned tenant households. A household is defined as an extended family or several families—not necessarily related by blood—residing in one or several dwellings which have a common backyard (*dvor*). *Adult men* is the number of adult men residing on estate’s lands, which includes tenants and their male relatives and dependants, farmhands and subtenants, as well as tenants’ and landlord’s slaves. Landlords and male members of their family are excluded from the count. Standard errors are clustered at estate level.

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

Table 2 provides results of estimating model in (1) with OLS. I find that compared to estates kept under allodial tenure by 1500, properties that were feudalized circa 1490 experienced a sharp 21-22% decline in grain productivity (columns 1 and 2 of Table 2), a 7-9% decline in total grain yield (columns 3 and 4) between 1482 and 1500 and 11% decline in total grain yield between 1482 and 1558, and, finally, a 5.6-7.4% increase in total grain yield per adult man (columns 7 and 8) between ca. 1482 and 1500. However, I find no evidence for the effect of feudalization on log of per household grain yield. Table 3 above shows OLS estimates of the effect of feudalization on a number of estate-level population variables. I find that between circa 1482 and 1500, feudalization caused a 2% decline of settlements within the estate, a 10% decline in the number of tenant households (columns 3 and 4) and a 14-15% decline in adult male population (columns 5 and 6), which includes tenants themselves, their male dependants and relatives, farmhands and subtenants, and slaves. Finally, feudalization is associated with a 4-5% reduction in the number of adult men

Table 4: IV Model – First Stage

<i>Dep. var.:</i>	Feudalized by 1490 (yes/no) \times Post-Reform	Feudalized by 1490 (yes/no)
<i>Period:</i>	1482 & 1500	1482 & 1500
<i>Model:</i>	DiD (1)	DiD (2)
Designated allod in 1478 (yes/no)	0.13*** (0.03)	−0.50*** (0.09)
_____ \times Post-Reform	−0.76*** (0.03)	−0.00 (0.00)
<i>Fixed Effects:</i>		
Post-Reform FE	Yes	Yes
1478 County FE	Yes	Yes
1482 Province FE	Yes	Yes
1478 Landowner FE	Yes	Yes
<i>Controls:</i>		
Avg pre-1500 CSI	Yes	Yes
Avg distance to rivers	Yes	Yes
Avg distance to Novgorod	Yes	Yes
Avg min distance to kurgans	Yes	Yes
_____ \times Post-Reform	Yes	Yes
# of 1482 Provinces	3	3
Observations	2980	2980
Sanderson-Windmeijer F-stat.	750.1	754.2
p-value	0.000	0.000

Note: The table reports first stage regression results from an IV model using estate’s status as designated allod. *Designated* is a dummy variable which equals to 1 if an estate belonged to the archbishop, a monastery, a church, a freeholder, or at least one of the 40 dissenting private landowners. Unit of observation is the estate-year. Outcome variables correspond to the outcome variables in Table 2. Controls include average pre-1500 Caloric Suitability Index (CSI) from [Galer & Özak \(2016\)](#), average unweighted distance to a nearest river, to Novgorod, and to nearest kurgan in kilometers, and all three interacted with the post-reform dummy. Standard errors are clustered at estate level.

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

per tenant household (columns 7 and 8). These results are in line with [Kolmogorov \(1922/1994\)](#), who in his study of tax cadasters of Shelonskaya Province makes a conjecture that in response to increased oversight, tenant households on newly feudalized lands may have partially switched to less efficient female labor in grain production (which needs centralized processing, and thus is prone to close oversight), while some men from these households could have found work or tenancy on allodial estates, or increased their specialization in husbandry and other productive activities such as fishing, hunting, honey harvesting, and crafts that were harder for the landlords to observe and tax.

II. INSTRUMENTAL VARIABLE DESIGN.—The remaining identification threat when estimating model in (1) is that feudalization status might be correlated with other unobserved estate-specific characteristics, which would bias my estimates of τ . To alleviate the concern of possibly endogenous feudalization, I use a feature of land expropriation campaign

which preceded the *pomestie* reform in Novgorod. In the winter of 1475/76, Grand Prince of Moscow Ivan III visited Novgorod on a diplomatic mission. While staying in the city, he ordered all residing aristocrats, privileged citizens, and other big landlords and republican officials to bring gifts and pledge their allegiance to him. A number of people who previously supported an alliance with Grand Duchy of Lithuania stood him up and refused to do so. Upon his return to Moscow, Ivan has started negotiations with republican elites about the terms of Muscovy’s takeover.

In 1477, in exchange for a promise not to touch private allodial estates belonging to loyal Novgorodians, he demanded handover of half of all lands owned by the archbishop, monasteries and churches, as well as arrest and transfer of all lands which belonged to those who dissented during his visit—[Abramovich \(1975\)](#) finds around 40 such people—to him personally. In 1478, he issued another proclamation promising not to expropriate the lands of petty freeholders. Moreover, he ordered his representatives in Novgorod “not to ruin the old ways” (*...stariny ne rushati...*) of life of estates expropriated from those 40 dissenters and various ecclesiastical entities, and instructs state surveyors not to change old tenancy contracts too much (*The Complete Collection of Russian Chronicles*, vol. XXV, pp. 308-322). Despite the fact that people conducting the first survey and Viceroy Novgorod were given a lot of discretionary power in expropriating estates and their subsequent feudalization, they were nonetheless expected to follow these two earlier royal proclamations. Additionally, [Frolov \(2017\)](#) argues that there were no significant differences in organizational structure of private and ecclesiastical allodial estates during the republican period, meaning that overrepresentation of ecclesiastical allods among estates designated to keep allodial tenure should not be a thread to identification. Finally, since both the proclamation and the instruction to state surveyors were made in circa 1478—way before the new Muscovite administration even started the first centralized survey—I argue that estate’s status as designated allod would allow me to disentangle plausibly exogenous variation in feudalization status by circa 1490: estates were designated into allods in 1478 based on old landowners’ identity and not the data about productivity, yield, or population characteristics, which, at the time, were unobserved by Ivan and his Novgorodian representatives.

An estate was coded as a designated allod if it belonged to at least one dissenting private landowner, the archbishop, a monastery, a church, or a freeholder in circa 1478. Conditional on parish fixed effects, there were no statistically significant differences in raw variables, main outcome variables, or controls between designated and non-designated estates in circa 1482, some 4 years after the annexation. Arguably, this means that IV satisfies exclusion restrictions (at least on observables). Furthermore, one could also interpret this result as evidence that, absent of feudalization, the 1478 decrees alone did not affect tenants’ or land-

Table 5: Table 5: IV Model – Reduced Form

<i>Dep. var.:</i>	log Grain Productivity	log Yield	log Yield Per Man	log Yield Per HH	log Sett- lements	log HH	log Men	log Men Per HH
<i>Period:</i>	1482 & 1500							
<i>Model:</i>	DiD (1)	DiD (2)	DiD (3)	DiD (4)	DiD (5)	DiD (6)	DiD (7)	DiD (8)
Designated allod in 1478 (yes/no)	−0.18*** (0.06)	1.95*** (0.49)	0.10 (0.07)	−0.02 (0.07)	1.64*** (0.50)	2.02*** (0.52)	1.89*** (0.55)	−0.08 (0.10)
_____ × Post-Reform	0.18*** (0.03)	0.06** (0.02)	−0.05** (0.02)	−0.02 (0.03)	0.06*** (0.02)	0.07*** (0.02)	0.12*** (0.03)	0.03** (0.01)
<i>Fixed Effects:</i>								
Post-Reform FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1478 County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1482 Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1478 Landowner FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Controls:</i>								
Avg pre-1500 CSI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg distance to rivers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg distance to Novgorod	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg min distance to kurgans	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
_____ × Post-Reform	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of 1482 Provinces	3	3	3	3	3	3	3	3
Observations	2980	2980	2980	2980	2980	2980	2980	2980
Unit of observation	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year

Note: Standard errors are clustered at estate level.

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

lords' behavior. I, therefore, argue that this result rules out pre-feudalization adjustments of tenant's choice of labor provision and crop specialization following the 1478 decrees. To study the effect of feudalization on productivity and population using estate's designation status as instrument, I estimate the following model with 2SLS:

$$Feudalized_i \times Post_t = \phi Designated_i \times Post_t + \delta Designated_i + \theta Post_t + \mathbf{X}_i^T \eta + v_{it} \quad (2)$$

$$Feudalized_i = \xi Designated_i \times Post_t + \lambda Designated_i + \kappa Post_t + \mathbf{X}_i^T \varphi + \mu_{it} \quad (3)$$

$$\log y_{it} = \gamma Feudalized_i \times Post_t + \alpha Feudalized_i + \beta Post_t + \mathbf{X}_i^T \psi + \varepsilon_{it} \quad (4)$$

Table 4 presents the first stage estimates and Table 5 shows reduced form estimates. There are two endogenous variables in (4) and, therefore, the model has two first stage equations, (2) and (3). Expectedly, for the treatment dummy $Feudalized_i$ first stage, interaction of instrument with post-feudalization dummy matters little, but the instrument itself is strongly significant (column 2 of Table 4). Both the instrument and the interaction are strongly significant in the $Feudalized_i \times Post_t$ first stage (column 1 of Table 4). To formally evaluate the overall strength of the instruments, I report the Sanderson-Windmeijer F -statistic, which in both cases is above 700, indicating that weak instruments are not an issue. Looking at the reduced form estimates in columns 1-8 of Table 5, the coefficients on the interaction of instrument with post-feudalization dummy all have expected sign and are in line with OLS

Table 6: Table 6: IV Model – Main Results

<i>Dep. var.:</i>	log Grain Productivity	log Yield	log Yield Per Man	log Yield Per HH	log Sett- lements	log HH	log Men	log Men Per HH
<i>Period:</i>	1482 & 1500							
<i>Model:</i>	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
<i>Naïve DiD estimates</i>	−0.22*** (0.03) (1)	−0.07*** (0.03) (2)	0.07*** (0.02) (3)	0.02 (0.02) (4)	−0.02** (0.01) (5)	−0.10*** (0.03) (6)	−0.15*** (0.02) (7)	−0.04*** (0.01) (8)
Feudalized by 1490 (yes/no)	0.28** (0.14)	−3.84** (1.27)	−0.16 (0.16)	0.03 (0.12)	−3.29*** (1.27)	−4.28*** (1.30)	−4.12*** (1.40)	0.14 (0.16)
_____ × Post-Reform	−0.23*** (0.02)	−0.08** (0.03)	0.07*** (0.02)	0.01 (0.03)	−0.06** (0.03)	−0.09*** (0.02)	−0.14*** (0.02)	−0.04** (0.01)
<i>Fixed Effects:</i>								
Post-Reform FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1478 County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1482 Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1478 Landowner FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Controls:</i>								
Avg pre-1500 CSI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg distance to rivers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg distance to Novgorod	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg min distance to kurgans	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
_____ × Post-Reform	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of 1482 Provinces	3	3	3	3	3	3	3	3
Observations	2980	2980	2980	2980	2980	2980	2980	2980
Unit of observation	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year	Estate/ Year

Note: Standard errors are clustered at estate level.

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

estimates both in the magnitude and statistical significance.

Table 6 report 2SLS-IV estimates of the effect of feudalization on productivity, measures of yield, and population. I find that for all outcome variables of interests, OLS estimates are well within confidence intervals of 2SLS-IV estimates. In fact, 2SLS-IV estimates almost coincide in magnitude with OLS estimates across all outcome variables, meaning that the effect of feudalization for compliers—estates that (i) *were not* selected by the royal proclamations of 1478 into a sample of properties allowed to keep their old allodial tenure and (ii) got feudalized circa 1490—is not much different than the effect of feudalization for the general population.

Finally, Table 7 provides Heckman selection model (Heckit), Heckit-IV, OLS, and 2SLS-IV estimates of the impact of feudalization by ca. 1490 on a number of long-term outcomes, including estate’s generated per capita tax income in 1576/77, the share of peasants on coercive sharecropping contracts in this estate by ca. 1790, and whether peasants on this estates were involved in any form of commercialized handicraft or proto-industrial production by ca. 1790. I find that both baseline estimates and the estimates using designation of estates into allods as an instrument have the same sign and magnitude. Specifically, I find that estate’s conversion to a fief by the late 15th century is associated with 13-16% lower per capita tax income generated by the estate, 11-12% higher incidence of sharecropping by

Table 7: The Effect of Feudalization on Long-Run Development

<i>Dep. var.:</i> <i>Period:</i> <i>Model:</i>	log Tithe Tax Per Man		Share of Peasants on Sharecropping		Commercialized Handicrafts (yes/no)	
	1576/77		1790		1790	
	Heckit (1)	Heckit-IV (2)	OLS (3)	2SLS (4)	OLS (5)	2SLS (6)
Feudalized by 1490 (yes/no)	-0.13*** (0.04)	-0.16*** (0.05)	0.12*** (0.03)	0.11*** (0.02)	-0.10*** (0.02)	-0.11*** (0.02)
Inverse Mills ratio	0.20*** (0.06)	0.22*** (0.08)				
<i>Fixed Effects:</i>						
1478 County FE			Yes	Yes	Yes	Yes
1790 County FE			Yes	Yes	Yes	Yes
1482 Province FE			Yes	Yes	Yes	Yes
1478 Landowner FE			Yes	Yes	Yes	Yes
<i>Controls:</i>						
Avg pre-1500 CSI	Yes	Yes	Yes	Yes	Yes	Yes
Avg distance to rivers	Yes	Yes	Yes	Yes	Yes	Yes
Avg distance to Novgorod	Yes	Yes	Yes	Yes	Yes	Yes
Avg min distance to kurgans	Yes	Yes	Yes	Yes	Yes	Yes
Avg distance to 1478 county church	Selection	Selection				
Avg land quality [1, 3] in 1790			Yes	Yes	Yes	Yes
# of 1482 Provinces	3	3	3	3	3	3
Observations	1005	1005	1490	1490	1490	1490

Note: Standard errors are clustered at 1478 county \times 1790 county level

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

ca. 1790, and 10-11% lower probability of being involve in commercialized handicrafts or proto-industrial production. Overall, I conclude that feudalization induces severe misallocation of factors of production that continues to depress profitability and hinder economic development for as long as the remnants of the feudal regime are in place,

4 Conclusion

Feudalism was the predominant sociopolitical system and form of land ownership throughout medieval Europe, yet very little causal evidence of its impact on agricultural productivity, labor markets, and welfare exists. Feudalism is largely viewed as a counterfactual form of land tenure to allodial ownership, characterized by absentee ownership, higher degree of peasant commune's autonomy, and fixed-rent tenancy contracts. In contrast, feudal tenure was a form of direct ownership which oftentimes implied broader involvement in—and control over—communal affairs by the landlord, closer oversight, and, as a result, higher relative weight of labor obligations and sharecropping in tenancy contracts. Moreover, feudal tenure is often linked to the emergence of extreme form of labor coercion and mobility restrictions, such as serfdom and slavery.

To the best of my knowledge, this paper is the first one to examine the impact of feudalism on productivity, labor markets, and welfare at the onset of feudalisation and in the

long-run by studying one of the largest land redistribution campaigns in late medieval and early modern Europe—the feudal *pomestie* reform of the late 15th-17th century in Russia. The pilot stage of this reform took place in the former Republic of Novgorod following its annexation by the Grand Principality of Moscow in 1478. Between 1478 and circa 1484, the new Muscovite administration expropriated almost 88% of all previously allodial lands in the former by circa 1490. The central government in Moscow, facing constant defence externality and inability to organize direct taxation in the remote parts of growing Principality, soon extends the *pomestie* system to all of Muscovy. Concerned about fiscal sustainability and military potential of this new system, in the early 1480s Grand Prince of Moscow Ivan III launched the first comprehensive tax survey of all newly acquired territories. These surveys would later become regular, with follow-up surveys organized in circa 1500, in the late 1530s, in 1550, and so on.

I undertook a large-scale digitization of all surviving tax cadaster from 1478-1628 covering the former Republic of Novgorod. This paper focuses on the earlier period of the *pomestie* reform in this region. Two key sets of findings emerge from my analysis. First, I find that, compared to estates that remained under allodial tenure, properties that were feudalized by circa 1490 experienced a sharp decline in grain productivity (the ratio of total grain yield to amount of seeds used), a decline in total grain yield, and an increase in total grain yield per adult man between circa 1482 and 1500. Second, I show that between circa 1482 and 1500, feudalization caused a decline in the number of tenant households and adult male population, which includes tenants themselves, their male dependants and relatives, farmhands and subtenants, and slaves. Finally, I demonstrate that feudalization is associated with a reduction in the number of adult men per tenant household. All of these results confirm [Kolmogorov's \(1922/1994\)](#) conjecture about the change in household specialization and allocation of male labor in response to feudalization.

At the moment, I am unable to separate the effect of abolition of communal institutions from the effects of change in tenancy contracts following feudalization. This is left for future iterations of this paper that will make use of rich, village- or commune-level geocoded data from Novgorodian tax cadasters. While most of the raw microdata is collected at the moment, the bulk of the work remains to be done to (i) finish codifying detailed, item-by-item tax and labor obligations for approximately 4000 settlements in the northwest of the Viceroyalty of Novgorod, in Vodskaya and Obonezhskaya provinces, (ii) finish geocoding of approximately 3000 villages in the south and the northwest of the former Republic using georeferenced 18th century cadasters and commentaries to them, (iii) match the resulting settlement-level cross-sectional datasets of every wave of tax surveys (i.e., ca. 1482, 1500, etc.) across years.

5 Appendix

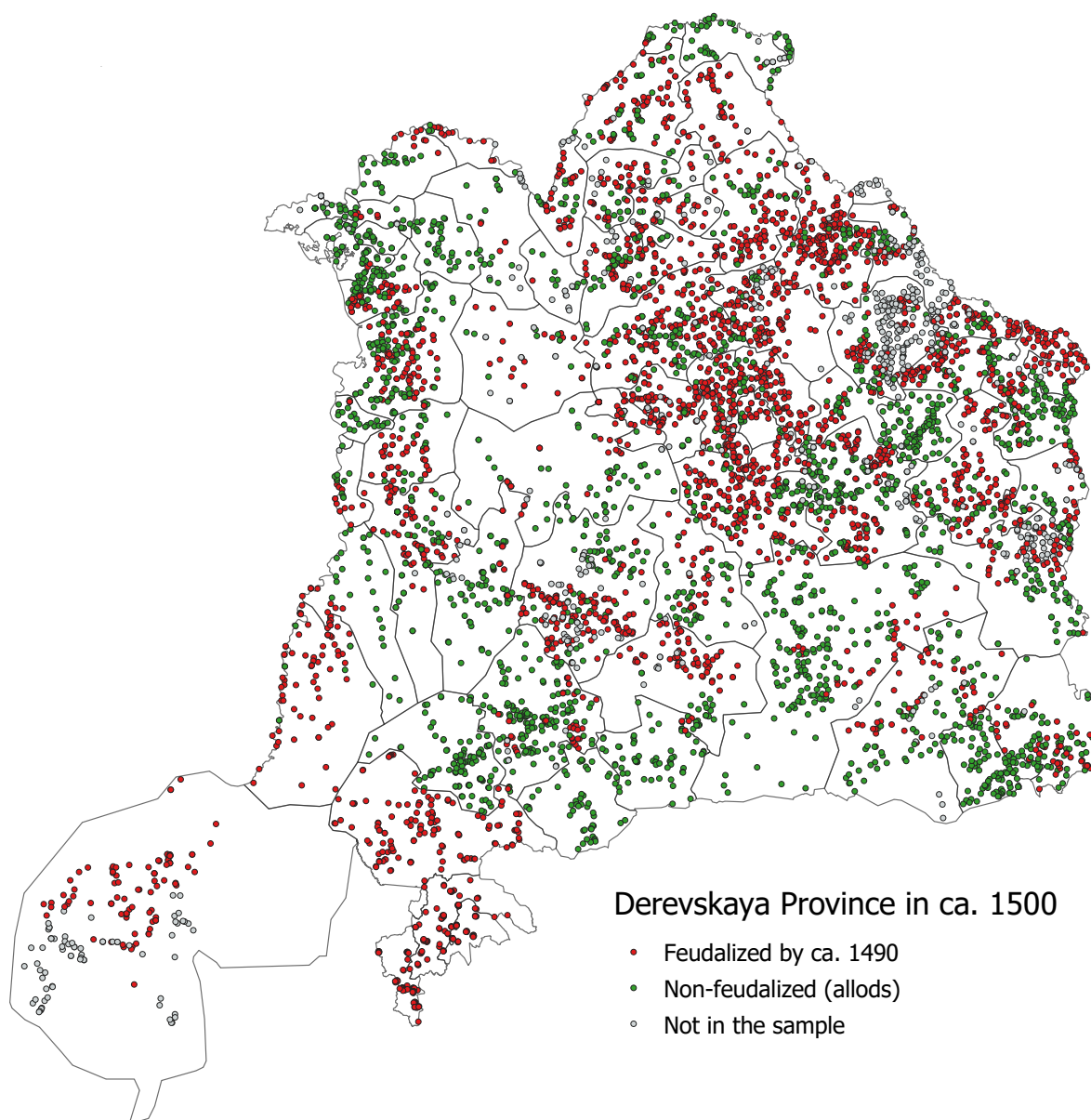


Figure 2: The map depicts 8858 geocoded settlements from 1478-1500 tax cadasters of Derevskaya Province. The second Muscovite field survey was conducted by Prokofiy Skurat-Stanishchev, son of Zinoviy, and Petr Volk, son of Boris, in the winter of 1495 and the spring of 1496. Settlements that were part of feudalized estates are labeled with red dots. Non-feudalized settlements are labeled with green dots. Geocoded settlements with missing 1482 data are in gray. Solid lines depict parish boundaries.

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