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Abstract

We measure pre- and post-tax income inequality in Moscow Province in 1811. We collect new data on incomes for 7,399 asset-holding households, including all registered aristocrats and merchants. We estimate the average incomes of 21 additional social groups using financial records from government and private businesses. Combining this data, we construct a social table and measure top-tier income concentration, Gini coefficient, and the Extraction Ratio. Our findings reveal that serfdom resulted in high inequality and extraction levels as well as low social mobility in spite of low levels of enforcement by the state. We compare our results with those for 1904 and find that, in spite despite emancipation, inequality remained high during the 19th century. Those findings are emblematic of deep historical roots and the persistence of high inequality levels in Russia.

JEL Codes: N00, N13, N33, J16, D63

Keywords: Russian Empire, Wealth, Income, Inequality, Pre-Industrial World

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INTRODUCTION

An influential theoretical literature has argued that extractive institutions both hinder economic growth and promote high inequality (e.g., Acemoglu & Robinson 2012). Serfdom is an archetypal extractive institution which concentrates economic and political power within a small landed elite while restricting serfs' control over their labor (Acemoglu & Wolitzky 2011). According to the conventional view of serfdom, a small number of people controlled land, wealth, and capital, and extracted the surplus from serfs and other underprivileged classes, who received only subsistence incomes. However, empirical evidence regarding the level of inequality in serf economies remains limited. Specifically, there has been no quantitative investigation of the income inequality and surplus extraction levels by the elites in Russia – a quintessential serf economy.

This article studies income and its distribution in Moscow Province in the early nineteenth century. It uses new archival, granular, household-level data to capture the elite's income from serfdom, among other sources, and shows that Russian elites were able to extract much of the surplus. Specifically, we construct a new dataset of the income of every Russian aristocratic family who resided in Moscow Province in 1811 and combine it with similar data on the property-owning elites belonging to other social classes. By combining household and group level data we estimate national income and Gini coefficient of income distribution which at 65 is comparable to today's high levels. Following the method developed by Milanovic and collaborators (2011) we also calculate the extraction ratio at 95%. Moreover, while confirming the high extraction levels in Moscow Province our detailed data also identifies 36 former serfs among the top one percent of earners. Thus, we are the first to provide a more nuanced quantitative picture of the economic impact of serfdom on inequality.

Our work speaks to the tension in the literature between theoretical or macro-level work that emphasizes the extractive nature of serfdom, and micro-histories that highlight that serfdom was a relatively effective system given historical context. Our results suggest that both can be true: serfdom was (a) associated with low overall income levels, it (b) allowed the elite to capture a lion's share of the national income, while it (c) also allowed for some mobility for the serfs to reach the top one percent of the income distribution. Therefore, this article points to a need for a better understanding of the inner workings of the serf economy with all its complexities. Moreover, when put into a historical context, our results give quantitative evidence that serfdom was associated with high inequality and that similar levels of inequality have persisted despite the abolition of serfdom, five wars, three revolutions, and two radical changes of political regime.

Moscow Province is suitable for studying Russian serfdom and historical income levels for several reasons. First, because its economy was primarily agricultural while its soils were not

very suitable for farming, it represents the adverse conditions typical of the majority of provinces in European Russia. Second, it had a high share of serfs in the total population. Third, as a proto-industrial urban center and a trade hub connected to an excellent river infrastructure Moscow Province is a suitable setting for examining the impact of serfdom on economic development in an area with economic opportunities. Fourth, because many international studies of pre-industrial income focus on the capital region of each country an investigation of Moscow Province fits well within the existing literature.

In more detail, we study the pre-tax and post-tax income of the population of Moscow Province including the elites in 1811, i.e., before the destruction brought about by Napoleon's Grand Army. We examine the incomes of the entire population. Due to the composition of our data, we divide the population into two broad categories, (a) unique asset-holding elite households for which we compile household-level data, and (b) 21 types of propertyless households for which we estimate average incomes due to the lack of household-level data.

Regarding the asset-holding elite, we collected new archival evidence showing the income generated from land, factories, capital, and governmental posts held by the elite in Moscow Province. This extensive dataset includes 7,399 property-owning households, equivalent to around three percent of the total population, encompassing all registered landed aristocrats and merchant guild members, as well as, property-holders from other social classes, including serfs. Specifically, we collected comprehensive data on the income of individual aristocrats residing in Moscow Province, stemming from serf duties, i.e., primarily unpaid labour duties (corvée/barshchina) and paid levies (quitrent/obrok), performed on the land estates located both within and outside the province, enabling a thorough examination of the distribution of rents resulting from serfdom. The united income of this elite group was around 57% of the total income of the entire Moscow Province.

To account for the remaining 97 percent of propertyless households with no household-level data we have compiled both previously published data and newly obtained archival information from both governmental and private bodies. With this data, we have reconstructed the average incomes of households of 21 distinct social groups, covering all social classes except the aforementioned registered aristocrats and merchants, for whom we have gathered household-level data. By merging the 7,399 property-owning households with household-level data with 222,114 households belonging to one of the 21 groups with average incomes, we have constructed a detailed social table that provides an unprecedented level of granularity compared to many existing social tables of preindustrial societies, which often lack any household-level data.

Our main results underscore the historical presence and persistence of high inequality levels in Russia. The latest research on disparity in present-day Russia by Daniel Treisman (2016) noted the unusually high number of billionaires, resulting in a high level of inequality in the country by global standards. According to Thomas Remington (2018), the disparities stemmed from Russia's heavy reliance on natural resources both nowadays and in the past. To showcase deep-rooted patterns of inequality, Peter Lindert and Steven Nafziger (2014) provided comprehensive estimates of Russian inequality dating back to 1904 and identified a high concentration of income at the time (see also Novokmet et al. 2018). Moreover, Lucas Chancel and Thomas Piketty (2021) studied the data available in the World Inequality Database and suggested that inequality in Russia remained roughly stable between 1820 and 1920 and that the emancipation of the serfs in 1861 was not followed by a sudden drop in inequality. While the last study focused on the territory of the entire country, our findings for Moscow Province in 1811 are a first step towards understanding inequality levels in Russia in the 19th century at a provincial level. We find that the Gini coefficient of the income distribution of national and within-province incomes were 65 and 57 respectively. By comparing our estimates with those provided by Lindert and Nafziger (2014) for 1904, we find that these inequality levels remained high despite the emancipation of the serfs in 1861. We also identify a vast concentration of assets within the hands of a narrow group of aristocrats mirroring the concentration by the present-day oligarchs. Moreover, our analysis of the income data highlights the highly extractive nature of serfdom, resulting in levels of inequality approaching its theoretical limits (extraction ratio equal 95%).

Our study contributes to the economic history literature in several key ways. First, our research complements existing studies on long-term wealth and income concentration among elites, addressing common limitations (for a comprehensive review, see Alfani 2021). Traditionally, economic historians used tax data to study wealth and income inequality in early modern economies. However, this method cannot account for individuals without property who were not subject to taxation. Our approach overcomes this limitation by utilizing Russia's caste-based social structure. In our analysis, all aristocrats, regardless of property ownership, had to submit an individual tax return. Moreover, when calculating duties, many pre-modern tax authorities assumed the incomes of various social groups, including the average incomes of the top earners. This flattens the distribution of incomes at the top and artificially narrows inequality levels. Our data on the self-reported incomes of the members of the asset-owning elite also allows us to bypass this limitation and capture the upper distribution more effectively. For the propertyless majority of the population, however, we rely on our new estimates of the average

incomes of 21 different types of social groups in Moscow Province. Table 1 below provides a summary of our key findings.

Table 1. Gini coefficient of income distributions of pre-tax and post-tax incomes

Type of households	Number of households	Gini, pre-tax	Gini, post-tax
Unique asset-holding households, each with its own household-specific income	7,399	74.5	73.8
Households belonging to one of the 21 groups with a corresponding estimated average income	222,114	24.6	26.4
All households in Moscow Province	229,513	65.4	67.2

Source: See the text.

Second, our research contributes valuable insights to the ongoing discussion about the economic consequences of extractive institutions, such as serfdom (Acemoglu & Wolitzky 2011, Stanziani 2014A, Buggle & Nafziger 2021, Dennison 2006, 2011, Domar 1970, Hoch 1986, Malinowski 2016, Markevich & Zhuravskaya 2018, Moon 1996, Mironov 2010, and Ogilvie & Carus 2014). Russian serfdom has mostly been studied via the prism of the records left behind by individual estates employing modern accounting techniques, thus potentially suffering from a selection bias and lacking an aggregate perspective.[1] Moreover, while serfdom is commonly recognized as an extractive and growth-limiting institution, the empirical evidence supporting this assertion has been limited to the recent work by Mikołaj Malinowski and Jan Luiten van Zanden (2017) on sixteenth-century Poland. However, no such quantitative analysis has been conducted for pre-emancipation Russia, except for the work of Boris Mironov (2000), who excluded the aristocracy and peasantry, and thus serfdom, from his study. We contribute to these discussions by examining pre-tax and post-tax income and its distribution within the framework of the Inequality Possibility Frontier proposed by Branko Milanovic and collaborators (2011). We complement the literature based on a detailed study of individual estates with an aggregate study of all the estates. We support the view that serfdom was associated with a high inequality and low growth regime. We find that Moscow Province was relatively poor in per capita terms. Moreover, due to the regressive nature of the tax system, its income inequality levels were very high at 65 pre- and 67 post-tax respectively. When placed within the Inequality Possibility Frontier framework, our findings reveal that serfdom was profoundly extractive with the extraction levels nearing their theoretical peak.

[1] The most recent empirical studies of pre-1861 Russian living standards are Dennison & Nafziger (2013) and Korchmina (2020).

Third, Marxist historians argued that Russian serfdom was unprofitable, which led to its ultimate abolishment (e.g., Pokrovskii 1934). This thesis was empirically and theoretically challenged by Evsey Domar and Mark Machina (1984), who argued that the profitability of Russian serfdom was not threatened by the rise in grain prices, the growth of population, Paul's Law, or the use of the obrok system. The authors, however, used only fragmentary evidence and did not observe the aristocratic profits directly. This article contributes to the debate by analyzing detailed archival information on aristocratic incomes and attributing the high inequality levels to serfdom and income concentration by the aristocratic elite. Specifically, we uncover that income derived from serfdom accounted for a significant portion of the income, with the aristocracy (comprising roughly one percent of the population) deriving as much as 34 percent of within-province or 14 percent of the national income of Moscow Province, even after accounting for the income from industry.[2] This reaffirms the conventional understanding of serfdom as a cornerstone of the early nineteenth-century Russian socio-economic structure and a primary source of high incomes for the elite.

Fourth, according to the literature, despite various limitations to their mobility, for the most industrious serfs, economic advancement within the system was possible (e.g., Moon 1996, Dennison 2011, Stanziani 2014). Our study sheds more light on this issue. It reveals that members of all social classes and estates had the potential to enter the top one percent of income earners due to their incomes from factories and trade. However, due to the limited industrial production and access to trade, the top one percent remained largely dominated by the aristocracy. These findings underscore the predominantly agrarian nature of Russian society at the start of the 19th century. Notably, our research confirms the claims made by Alessandro Stanzani (2014A) and Steven Hoch (1986), who, using qualitative evidence, argued that serfs had the potential to climb to the top of the social ladder under serfdom. We study the merchant census of 1811 (Naydenov 1887) and identify 36 former serfs who entered the top one percent of households by income and registered as guild merchants, thus losing their formal former serf status. We find no individual who retained the serf status in the top one percent, however.

Fifth, Guido Alfani and Matteo di Tullio (2019) proposed that regressive taxation contributed to high inequality levels in preindustrial societies. We compare pre- and post-tax income inequality levels. Czarist Russia had limited fiscal capacity and taxation levels (Mironov 1992). We therefore find that direct taxes accounted for only four percent of the national income

[2] In line with the National Income framework, national income includes the income from estates located outside the Province.

and that taxation had only a marginal effect on income distribution. However, it is likely that this small difference compounded over time and contributed to the high general inequality levels.

The rest of this article is organized as follows: First, we provide an in-depth exploration of Russian serfdom and the ongoing debate surrounding its economic implications. We also offer insights into Moscow Province. Second, we introduce our newly compiled database, which includes income details for 7,399 asset-holding households around 1811, including their incomes from serfdom or industry. Third, we present the datasets on 21 various average group incomes, including various types of serfs and peasants. This allows us to cover both the asset-holding and the property-less population. Fourth, we combine the two types of data to create a social table that presents our findings on aggregated incomes and their distribution. Specifically, we study income, inequality, and extraction levels drawing international comparisons. Fifth, we compare our findings with those available for 1904 and discuss the observed persistence of high inequality levels despite emancipation. The last section discusses the results and concludes.

I. OVERVIEW OF RUSSIAN SERFDOM

Imperial Russia was characterized by scarce labor and abundant land. The population was divided into various estates (*soslovie*), each carrying specific tax obligations and legal rights. To grasp Russian economic history, it's crucial to recognize that the central state institutions in Russia lacked the capacity to fully control its vast territory (Velychenko 2001, Korchmina 2017). This decentralization of authority resulted in regional governance by local assemblies of the aristocracy (*dvoryanskoe deputatskoe sobranie*) and urban self-governing bodies (*gorodskoe samoupravlenie*). Decentralization granted the landed aristocracy the means to maintain their legal privileges, but also imposed on them the obligation to support serfs during times of famine. Simultaneously, it empowered serfs to engage in negotiations regarding the terms of their obligations and the assistance they could request. These ongoing negotiations between landowners and serfs resulted in a significant diversity of serfdom practices throughout Russia. Thus, Russian serfdom constituted a blend of formal and informal arrangements between landlords and village communes. Nonetheless, some common features of Russian serfdom, typical for the central European provinces, can be identified (see Dennison 2011 for a comprehensive overview).

First, as it was a feudal economy, the lion's share of land in Russia was owned by the tzar, the state, or the aristocracy. All estates, including peasants and peasants' communities, could lease land from those owners. This enabled wealthier tenants to request additional land, albeit at an extra cost. Specifically, through special legal practices, serfs could effectively lease land on behalf of an aristocrat. In these instances, the de facto lessee would receive all revenues from the

land, which were documented in legal records and subject to taxation. This practice enabled serfs, peasants, and merchants to establish their own manufacturing enterprises.

Second, while peasants resided on state-owned land, serfs lived on the land owned by the aristocracy. This distinction resulted in differential tax obligations. While both peasants and serfs were obligated to pay the poll tax (*semigrivennyi platez*) administered by the village commune, only peasants had to pay an additional monetary tax (*chetyrekhgrivenyi*, *obrochnyi* later). According to Mironov (2010), this tax was typically of lower value than the corvée (*barschina*) paid by the serfs in unpaid labor or quitrent (*obrok*), i.e., monetary compensation for forgone corvée.[3] Only aristocrats had the privilege of utilizing serfs for agricultural and industrial production without the need to provide wages. Aristocrats managed their demesnes primarily using unpaid serf labor. Consequently, their income from land could be equated with rent and income from serf labor (see Kula 1987, Domar & Machina 1984 for models of demesne economy based on serfdom).

Third, according to the conventional view, each aristocrat negotiated the size of quitrent and corvée with the village commune. The commune was responsible for allocating these obligations among its members. Serfs who paid quitrent typically received more land to accommodate the monetary payment. The available evidence, based on surviving records of private estates, suggests that by the early 19th century, at least half of all duties were settled through quitrent payments (Dennison 2013). Nevertheless, these studies may be subject to selection bias, as more modernized and market-oriented estates were more inclined to favor monetary over labor obligations (Stanziani 2014A).

Fourth, the traditional method of distributing land among serfs and peasants by their communes aimed for fairness. In principle, each household received land in proportion to its size, preventing excessive concentration. Additionally, there was also limited 'free/unassigned' land. The well-to-do serfs and peasants could rent it from either their communes (part of the communal property), directly from the aristocrats, or from the state (Fedorov 1974, Aleksandrov 1976). However, in Moscow Province, state-owned land comprised only about one percent of the total land area indicating that the availability of free land was limited (Vodarsky 1988).

Fifth, serfs were subject to the jurisdiction of their landlords and represented by the aristocrat in external disputes. In the event of conflicts with their landlord, serfs had no recourse to appeal to the emperor; instead, their grievances were addressed in regional courts to which they

[3] According to our calculations income an aristocrat received from a male serf was around 9AR on average (see Figure 1). Taxes paid by serfs were around 2AR per male while peasants paid 8AR. Serfs therefore paid around 11AR per male in various duties compared to 8AR paid by peasants (see online appendix for calculation).

could not be elected. However, landlords could not unilaterally increase duties without risking a violent peasant uprising. Consequently, the aristocracy cooperated to align fee levels across their estates.[4]

Sixth, serfdom imposed legal restrictions on mobility. According to the Muscovite Law Code, *Ulozhenie*, published in 1649, to travel beyond approximately 30 kilometers (*versta*) from their villages, serfs were required to obtain written passports from the state, along with permission from their landlords. This constraint hindered urbanization, industrialization, and trade. Engaging in trade necessitated guild membership, obliging serfs and peasants to acquire licenses alike for selling their products in the market (as discussed below).

According to conventional wisdom, serfdom had adverse effects, including limiting economic output, contributing to high inequality, and facilitating resource extraction. This was achieved through several means: (1) constraining migration from the agricultural to the urban sector; (2) discouraging agricultural productivity by undermining incentive structures (higher output incentivized landlords to increase duties resulting in a ratchet effect); (3) hampering the accumulation of human capital; and (4) decreasing the purchasing power of the villagers (for summaries of these discussions see Dennison 2011; Ogilvie and Carus 2014).

Daron Acemoglu and Alexander Wolitzky (2011) provided a theoretical model outlining that coercion is "always 'socially inefficient', because it involves a costly way to transfer resources from workers to employers". Andrei Markevich and Ekaterina Zhuravskaya (2018) identified empirically that serfdom stifled agricultural productivity. Additionally, Johannes Buggle and Steven Nafziger (2021) suggest that the legacy of serfdom continues to hinder industrial development and household expenditure in present-day Russia.

Other scholars argue that Russian serfdom and economic growth were not incompatible (e.g., Melton 1984, Hagen 2002). A stream of literature portrays serfdom as a dynamic institution that sustained a considerable rate of economic development (Hoch 1986, Moon 1996, Mironov 2010, Dennison 2011, and Stanziani 2014A). This view posits that serfdom, in some cases, sustained economic development, allowing for entrepreneurial serfs to navigate its limitations by indirectly renting land, acquiring trade licenses, and establishing industrial production. In this article, we discuss specific evidence of such limited serf involvement in industry.

Some scholars who studied other countries than Russia argue that serfdom, in general, helped force the commercialization of agricultural output in societies with scarce supplies of labor

[4] The estate records managed by the Noble Trusteeships in Moscow, Ryazan, Samara, and Tambov exemplify that the aristocracy was aware of and discussed the quitrent sizes across various estates.

and underdeveloped markets (see Lamp and Sharp 2018). Michael Bush (1996) argued that surplus extraction by the demesne created large-scale commercial farming that would not have been created by free workers (Kula 1987). Similarly, Stefano Fenoaltea (1975) claimed that supervised coerced labor is more productive and therefore "cost-effective" than self-supervised free waged labor on estates specialized in a single effort-intense cash-crop. Furthermore, Mikołaj Malinowski (2016) argued that serfdom ensured the commercialization of agricultural production that would be withheld from the market during a time of a market crisis. Correspondingly, Douglass North and Robert Thomas (1973) argued that the improvement in market conditions in the 19th century contributed the abolishment of serfdom.

Concerning the distributional impact of serfdom, Russian historiography generally asserts that serfdom heightened economic inequality by restricting serfs' economic opportunities and social mobility. For example, Robert Jones (1997) argued that the inequality was high because the Russian state kept the poll tax low, which allowed the landlords to extract more surplus. Moreover, Tracy Dennison (2006) discussed in detail how by demanding duties landlords aggregated inequalities and locked poor serfs, especially widowed women, in poverty. This argument has been based on qualitative evidence. We advance this literature by a comprehensive quantitative analysis of income and its distribution in Moscow Province in 1811.

The distributional impact of serfdom has been also examined in various serf economies beyond Russia where serfdom was often examined in the context of the demesne economy. For example, in Poland, as noted by Witold Kula (1987) and Jerzy Topolski (1965), weak property rights of serfs enabled landlords to expand their demesnes and adjust rents to extract labour or surplus production. Evsey Domar (1970) highlighted that restrictions on serfs' mobility suppressed agricultural wages, benefiting the landlords. Edgar Melton (1988) explored similar labor relations in Prussia and Livonia, where landless agricultural workers existed. He described tenant farmers as 'labor brokers' who hired these landless laborers to meet their labor obligations. This relationship fits within a broader system of 'mediated extraction' proposed by Peters (1970), where tenant farmers, acting as agents of landlords, exploited the landless workers. Regarding the cities, Igor Zurimendi (2014) observed that these mobility restrictions also limited the influx of new workers into the urban sector, reducing competition between sectors and raising urban wages higher than they would be in a free labor market, thereby increasing the rural-urban wage gap. Within the urban sector, Mikołaj Malinowski and Jan Luiten van Zanden (2017) noted that greater extraction by landlords increased the demand for high-value-added manufactured products, raising the skill premium for urban craftsmen. To investigate these ideas, the authors constructed a social

table for the Voivodeship of Cracow in the 1560s, identifying high levels of inequality and extraction. This article follows this research method.

MOSCOW PROVINCE

Moscow Province, situated in the Russian Central Economic Region (*Tsentralno-Promyshlennyi raion*). The region is suitable for the study of serfdom because the institution was most common in the regions closest to Moscow and least prevalent in the regions added to the Empire. Moreover, because the serf population declined in the first half of the 19th century, our 1811 estimate captures the serf economy at its peak (Hoch 1986). Furthermore, Moscow Province was one of the two key capital regions in Russia. While Saint Petersburg served as the country's administrative center, boasting a population of 336 thousand inhabitants, Moscow City, with its 270 thousand residents, served as its commercial nucleus, often referred to as the 'heart of Russia'. The establishment of Moscow Province dates back to 1782. In 1811, it had a population of approximately 1.2 million people and covered an area of about 33 thousand square kilometers. At the outset of the 19th century, Moscow Province accounted for roughly half a percent of the total landmass and two percent of the population of European Russia (Mironov 2000). According to Lindert and Nafziger (2014), who studied detailed regional data, by 1904, Moscow Province had evolved into one of Russia's wealthiest areas. Unfortunately, comprehensive regional economic statistics from the early 19th century are not accessible for comparative analysis with the other Russian regions. Nevertheless, several key factors set it apart:

Urbanization: Moscow Province had a relatively high population density, with 40 people per square mile (versta), in contrast to Saint Petersburg Province's 14 people per square mile (Rashin 1956). Furthermore, it boasted an urbanization rate of approximately 23 percent by 1800, making it the most urbanized region in the country. European Russia, in comparison, had an estimated urbanization rate of around 4 percent (see online appendix).

Agriculture: A report submitted by the Province's Governor to the Minister of Internal Affairs in 1810 described the province's agriculture and animal husbandry as very poorly developed (RGIA, f. 1281, op. 11, d. 82, p. 17). The availability of free land in the province dwindled already before the 19th century, and the amount of harvested grain per capita was 30 percent lower than the European Russia average (Nefedov 2005). Additionally, the amount of land per male taxpayer ranked among the lowest of the 26 provinces in European Russia (Ignatovich 1925, Kovalchenko 1967, Table 54). Moreover, according to Leonid Milov (2001), due to underdeveloped animal

husbandry agriculture lacked investments in natural fertilizers. The observations of past officials and historians align with modern soil suitability data from the Food and Agriculture Organization (FAO). According to recent soil quality data, the unweighted mean soil quality for low rye in Russia was 5,761, while the same parameter for Moscow Province is 5,251[5], which places Moscow among the less suitable provinces in Russia for agricultural production of rye (see Broadberry & Korchmina 2024). Despite these limitations, agriculture remained the dominant sector.

Industry: Around 16 percent of all factories in Russia, excluding the metal industry, were situated in Moscow Province. There were efforts to develop the textile, copper, and brick industries in the region (Golytsin 1807). We use detail industrial census data to shed more light on the issue (see online appendix).

Trade: There are no specific trade measurements available that would allow us to compare the returns on investment and trade volumes among provinces. However, Moscow merchants were historically renowned as some of the wealthiest in the Russian Empire.

All in all, the Moscow region serves as a suitable case for understanding the link between inequality and serfdom. On one hand, Moscow Province is representative of the agricultural development of Russia due to its poor soil conditions and exhaustive land exploitation. On the other hand, thanks to the high status of Moscow's aristocracy and their access to arable land outside of Moscow Province, particularly to the south, they could extract more resources. This theoretically allowed them to reinvest the gains from serfdom to develop better infrastructure, educational services, and industry to support their consumption in Moscow city where they resided. Therefore, the Moscow region serves as a potential testing ground for exploring alternative development paths for Russia in the 19th century, addressing the question of whether growth under serfdom and extraction was possible.

II. DATASET OF PRE-TAX INCOMES OF 7,399 ASSET-HOLDING HOUSEHOLDS WITH INDIVIDUAL-HOUSEHOLD-LEVEL DATA

We have created a comprehensive dataset that provides detailed information about the individual incomes of the asset-holding elite in pre-1861 Russia. This dataset encompasses individuals from

[5] Derived from Food and Agriculture Organization. FAO and IIASA. Global Agro Ecological Zones version 4 (GAEZ v4). URL: http://www.fao.org/gaez/

various social classes. It includes all aristocrats and registered merchants, as well as selected asset-holding members from other groups, such as serfs. In total, it comprises 7,399 households, which accounts for approximately three percent of the population. Specifically, the dataset includes information about their pre-tax incomes derived from the following sources:

(A) owning land in the case of aristocracy (serfdom),
(B) renting out houses,
(C) running factories (industry),
(D) obtaining posts in civil service,
(E) investing capital in trade in the case of merchants.

DECLARED INCOME FROM LAND

In February 1812, the Russian government introduced an income tax, which was collected annually until 1819. Tax declarations had to be submitted once a year for the current year except for 1812 when the incomes were submitted for 1811. This tax primarily targeted the previously untaxed income of the aristocracy generated from immovable property, including quitrent (monetary rent for land use) and corvée (implicit labor income from unpaid labor) obtained from serfs. The tax applied to all aristocrats, regardless of their income. Those with declared incomes below 500 assignat rubles (hereafter AR) were exempt from taxation, while incomes exceeding 500 AR were subject to progressive taxation ranging from one to ten percent (see online appendix). To compile our dataset, we collected all 5,581 income declarations submitted by aristocrats residing in Moscow Province for the year 1811.[6] This dataset includes declarations from all aristocrats living in the province. These declarations were submitted by men, women (married, unmarried, and widows), and trustees on behalf of children who could own property independently.

We have matched individuals into households, taking into account taxpayers' surnames, first names, patronymic names, ranks, and titles. To match a household, we looked for a husband and wife. Noblewomen in Russia held the same surname and rank as their husbands. This allowed us to match a husband and wife with a high level of accuracy. For additional certainty, we checked the timing of the tax returns. If the suspected married couple submitted their tax returns around the same time, we assumed they lived together. We also consulted additional family-specific genealogical sources. We kept sons and daughters as separate households if they submitted tax returns separately from their parents.

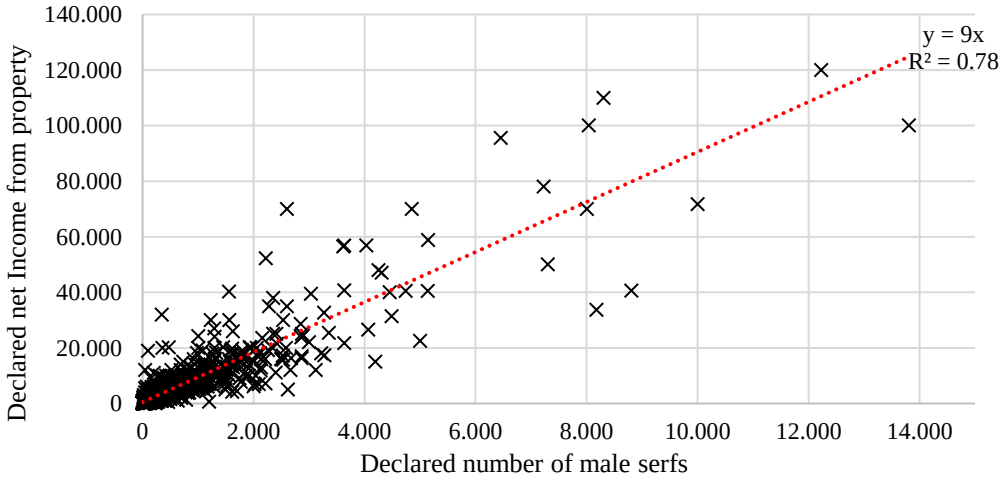
Our dataset provides a comprehensive view of the elite's income, including data on the total number of estates they owned and the number of estates in each province (although it does not break down income by estate). In total, we have identified 2,717 individual aristocratic households owning

[6] This is close to the previous estimate by Kabuzan and Troitskii (1971) that the group was around 4,000 people.

6,916 estates, with 2,168 of these estates located in Moscow Province (see map in the online appendix for the location of the estates per province). This dataset offers a valuable resource for understanding the income sources and economic activities of the Russian aristocratic elite during this period.

The reported taxable income was shared among other aristocrats during the Aristocratic Assembly. Elena Korchmina (2022) has corroborated the reliability of this source by cross-referencing tax returns with available estate accounts. Additionally, the fear of public exposure served as a deterrent and ensured the accuracy of tax declarations for several reasons. Firstly, inaccuracies and underreporting in publicly available information could hinder nobles' access to credit markets. Secondly, deliberately undervaluing incomes in public records could negatively impact one's standing in the marriage market. Thirdly, if other aristocrats suspected that a declaration was inaccurately filled out, they could bring it to the attention of the assembly. In such cases, the offender would be required to pay the double value of the tax. These factors, combined with the elite's inherent interest in safeguarding their property and maintaining social order in the face of the threat posed by Napoleon, incentivized tax compliance.

Figure 1: Correlation between the total number of male serfs and the incomes from property declared by the 1,613 members of the landed aristocracy residing in Moscow Province for 1811



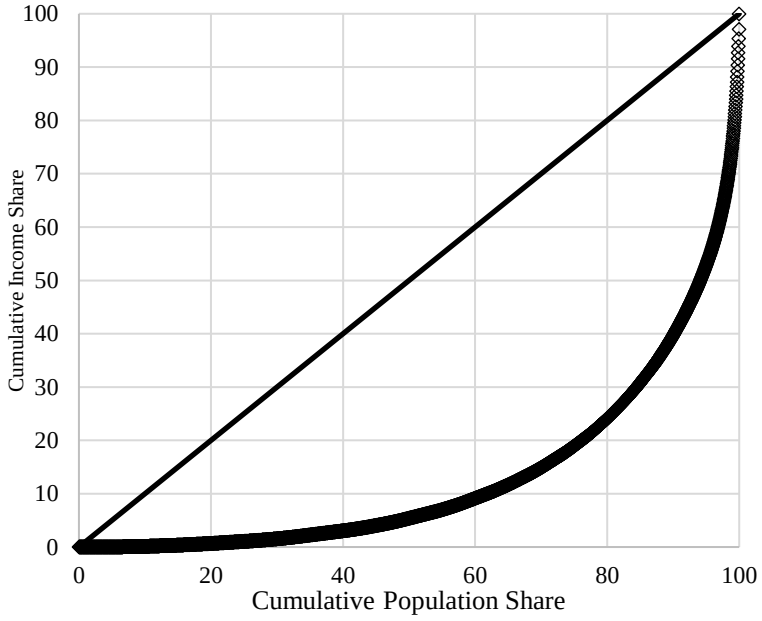
Note: Based on the dataset of individual incomes. To retain the scale, 6 outliers with astronomical incomes were excluded.
Source: see the text.

The income of the landed aristocracy from land consisted of serf duties. 1,613 aristocratic households declared both their total income from all their estates and the total number of male serfs living and working on all their land. Figure 1 charts that there was a strong and directly proportional relationship between the total number of male serfs and the landlords' incomes (the number of declared serfs explains as much as 83 percent of the variance of the reported incomes). This close correlation demonstrates that (1) serf duties were the main source of the aristocracy's income from real estate; (2) land was their main real estate; and (3) the total income declared by

the aristocracy approximates the total income from serfdom. In sum, aristocrats declared an income of 17,278,819AR from serfdom, which we estimate to represent as much as one-third of the national income, i.e., income generated both within and outside of the Moscow province for its inhabitants — or 14 percent of the within-province income, i.e., income generated only within the province. The difference stems from the fact that, as already discussed, Moscow aristocracy owned estates located both within and outside of Moscow Province.

The benefits of serfdom were not distributed equally among the landed aristocrats. The detailed income owned by each decile of population is available in the online appendix. Reported incomes varied widely, ranging from zero to an astonishing 500,000 AR, which was declared by Anna Alekseevna Orlova-Chesmenskaya.[7] Figure 2 presents a Lorenz curve of reported incomes. The Gini coefficient of income distribution was exceptionally high within this elite group, reaching 72.5 (excluding 34 zero-income aristocratic households) or 73.4 (including those households). This translates into a high income distribution across the whole population (Figure 4).

Figure 2: Lorenz curve of the distribution of the declared aristocratic gross, pre-tax incomes from property/serfdom



Source: see the text.

DECLARED PRE-TAX INCOME FROM RENTING OUT HOUSES

The real estate tax was mandatory only for the aristocracy. However, an additional 1,282 households from other social groups voluntarily declared their incomes from real estate. It is challenging to estimate the data coverage accurately. We argue that elite households were motivated to pay the tax voluntarily

[7] She was the unmarried daughter of Count Orlov, who was one of the leaders of the palace coup which led to the ascension of Catherine the Great. According to a widely accepted version he killed the dethroned emperor, Peter III. Anna owned ten large estates with as many as 27,014 male serfs.

because (a) it served as a signal of their high social status, and (b) it was a means to safeguard their property and privileges, particularly in the face of the revolutionary threat posed by Napoleon's Grand Army. Notably, these voluntary declarations often included specific details about the types of assets used to calculate taxable income. While the aristocracy primarily declared income from land based on serf rents and labor, landless groups reported income from houses. Table 2 provides a breakdown of the voluntarily declared income from land and houses among various social groups. The number of declarations submitted by each group correlated with that group's likelihood of owning real estate, with merchants submitting the most declarations and soldiers the fewest, reflecting the ownership structure within the sample. No serf declared the income houses.

Table 2: Pre-tax income from the real estate (land and house rents) declared by residents of Moscow Province for 1811

Social class of the household head	Number of households that submitted a declaration	Total declared income from land/serfdom (only aristocracy) or houses (AR)	Average income per household (AR)
Aristocrats	2,717 (total coverage)	17,268,819 (total income from serfdom)	6,360
Merchants	805	1,360,648	1,690
Townspeople	191	99,117	519
Personal nobles	156	56,327	361
Clergy	81	28,812	356
Foreigners	22	18,090	822
Artisans	16	11,290	705
Peasants	7	3,585	512
Soldiers	4	430	107
Total for all households	3,999	18,857,117	4,715

Source: TSGA Moskvy, f. 4 op. 1 d. 3225, 3226, 3227, 3228, 3229, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, GATO, f. 161, op. d. 1429, 2432, 1423, 1439. Note: Although the table assumes strict boundaries between different social groups, we recognize that the social structure of Russian society was more complex and fluid. For example, merchants of the 3rd guild could sometimes retain their previous status as townsfolk for a period, and vice versa. When assigning the social status, we relied on self-reported documents (such as tax returns and industrial censuses, where the social status of the owner seems to be self-reported as well). Therefore, our data at the household level mainly reflect the self-perception of the owners of immovable property.

CALCULATED PRE-TAX INCOME FROM FACTORIES

We also collected new archival data on all factories located in Moscow Province in 1809 (RGIA Russian State Historical Archive — St Petersburg F. 17. op. 1. D. 44). Specifically, we examined the previously unpublished industrial census conducted by the newly established Ministry of Internal Affairs, which was interrupted by the war. This register provides comprehensive details about significant factories, excluding distilleries, in European Russia. Our focus was on compiling data for Moscow Province. The source contains valuable information, including the names, surnames, patronymic names, social classes, noble ranks, and guild affiliations of each owner. We linked the owners of the factories with the applicants of the tax returns.

Table 3 presents details regarding factory profits categorized by social groups. In total, we identified 446 factories located in Moscow Province that collectively generated a profit of

3,382,502AR. This income was distributed among 414 factory-owning households (for detailed calculations, see the online appendix). This data suggests that factory ownership was relatively uncommon. Also, the ownership was not concentrated, as most property-owning families owned just one factory. Furthermore, while 60 percent of these factories were owned by merchants, a notable 30 percent belonged to peasants. However, it is important to note that the income generated by peasant-owned factories was significantly lower, averaging five times less. No factory was owned by a serf while two were owned by household serfs, but they generated the lowest incomes in the sample (see below for the discussion of the difference between the two groups). For this reason, no individuals categorized as serfs enter the top one percent of households by income (see later detailed discussion).

As previously mentioned, the income declared by the aristocracy serves as a proxy for the overall income generated by serfdom for the elite. When analyzing the factory data, it becomes clear that, even in the industrial heart of Russia, serfdom (accounting for 17 million in national income or 5.5 million in within-province income) yielded more income than the factories (3.5 million AR) did for the elite of Moscow Province. This underscores the predominantly agricultural nature of the Russian economy in the early 19th century.

Table 3: Summary statistics of the pre-tax income from the industrial census

Social class of the household head	Total profit from factories (AR)	Number of factories	Number of households	Average income per household (AR)
Aristocrats	186,991	46	27	6,926
Merchants	2,830,524	264	245	11,647
Non-hereditary nobles	10,552	2	2	5,276
Household serfs	615	2	2	308
Peasants	295,954	123	123	2,406
Townsfolk	38,610	12	12	3,218
Artisans	7,882	3	3	2,627
Total for all households	3,382,502	449	414	8,190

Source: see the text.

CALCULATED PRE-TAX INCOME FROM GOVERNMENTAL SERVICE

Starting from 1722, Russia's elite and government operated under the Table of Ranks, a hierarchical system with ranks ranging from 1 (the highest) to 14 (the lowest). This system was divided into two branches: military and civil service.[8] A person's rank signified their proximity to the emperor within each branch. Military service was exclusively reserved for the aristocracy. However, in the civil service,

[8] There was also a court service during this period, but for our analysis, we categorize it as part of the civil service.

only the top ranks (1–8) were restricted to aristocrats, while ranks 9–14 could be held by individuals who could be not a part of the aristocracy. The 14th rank was mainly filled by educated clergy, townspeople, merchants, and others involved in basic local administration. Civil servants in ranks 9 to 14, referred to as non-hereditary nobles (*lichnye*). Every aristocrat, non-hereditary noble, and civil servant who submitted a tax declaration indicated their rank. Governmental service salaries were standardized and fixed by the government for each rank.[9] We utilized these official salary regulations to calculate the income of each individual from their government service (see the online appendix for detailed calculations).

CALCULATED PRE-TAX INCOME FROM CAPITAL INVESTED IN TRADE

Trade and the movement of goods in Russia were subject to strict regulations and required a merchant license. In 1775, Empress Catherine the Great introduced reforms to the merchant guilds, where membership was based on the amount of capital invested in trade and came with various lucrative privileges. First-guild merchants had the authority to engage in foreign trade and own sea vessels; second-guild merchants could conduct trade across the Russian Empire and own riverboats; and third-guild merchants could operate local retail businesses and inns. In 1785, Catherine the Great implemented the "Charter to the Cities", which not only confirmed the merchant class's exclusive right to trade but also elevated their social status. For instance, merchants were exempt from compulsory military service if they paid for a substitute conscript. Additionally, first and second-guild merchants were spared corporal punishment, while first-guild merchants were granted the privilege of owning carriages, which had previously been reserved exclusively for the aristocracy.

Guild membership in the first, second, or third guild was contingent on the amount of capital invested in trade. Starting from 1807, the required capital thresholds were set at 50,000, 20,000, and 8,000 AR, respectively. V. N. Yakovtsevskii (1953) conducted an estimation of the profit rates for merchants, revealing that due to their monopoly on international trade, first-guild merchants enjoyed an impressive 25 percent annual return on their invested capital. Meanwhile, second-guild merchants, who dominated inter-regional trade, earned up to 20 percent in annual returns. These substantial yearly profits essentially constituted a form of rent provided by the state to the commercial elite. On the other hand, third-guild merchants derived their income from local retail, capitalizing on the price differential between retail (merchant shops) and wholesale prices (peasants' carts). Yakovtsevskii (1953) offered

[9] See laws no. 20143 and 24188 in: *Polnoe sobranie zakonov Rossiiskoi Imperii* [The Complete Register of Russian laws]. *Kniga shtatov*. Vol. XLIV. Part 2. Department III and IV. 1830 p. 233–236

data on the retail and wholesale prices of 15 common products in Moscow during the 1800s, revealing a price difference of about seven percent, which approximated the profit rate of third-guild merchants.[10]

To estimate the capital of each merchant, we assume that they possessed precisely the minimum required amount to join their respective guilds and subsequently obtained the corresponding annual rates of returns.[11] This results in estimated annual incomes of 12,500, 4,000, and 560 AR from the capital invested in trade for first, second, and third-guild merchants, respectively. In 1887, N.A. Naydenov published the merchant census of 1811, which included self-reported data on the size of each merchant's household in Moscow Province.

According to this census, there were a total of 4,067 merchant households, categorized as follows:

(A) 123 households belonging to the first guild, with an average of 6 people per household.

(B) 350 households in the second guild, also with an average of 5 people per household.

(C) 3,594 households in the third guild, with an average of 5 people per household.

This data suggests a total population of 20,467 individuals among these merchant households. Consequently, we estimate that the income generated from capital investments amounted to approximately 5 million AR.

SUMMARY OF ALL PRE-TAX INCOMES OF 7,399 ASSET-HOLDING HOUSEHOLDS

Table 4 below provides a summary of all the studied income sources of the asset-holding elite. We know the names and the reported incomes of all landed aristocrats, factory owners, registered guild merchants, and taxed real estate owners. The same person could obtain income from different sources. To avoid counting the same person more than once, we match and combine the available information on the different sources of income of each household head. In the case of aristocrats, we sum the incomes from land of all the household members with known individual incomes. In all the other cases, we assume that the household head was the only one with income. In total, we have information on 7,399 asset-holding households with household-level data. In sum, the household-level of the asset-holding elite totaled 29.5 million AR. The Gini coefficient for income distribution among the 7,399 asset-holding households is calculated at 75. Since assets (land, houses, capital) were the main source of the studied income of the elite, this result is also suggestive of a high level of wealth inequality within Russian society. We are unable to measure the exact levels of wealth inequality because our data does not report the exact prices of these income-generating assets. In the subsequent sections, we will

[10] Both first and second guild merchants were permitted to earn income outside Moscow Province, thus aligning their sources of wealth with the aristocracy that also owned estates within and outside of the province.

[11] We corroborate this with archival findings provided by Maria Aksenova (TsGA Moskvy, 2, op. 3, d. 209).

estimate the average incomes of non-asset-holding groups to gain a comprehensive understanding of income distribution in Moscow Province.

Table 4: The individual pre-tax incomes of the property-holding elite by the source of income.

Social class of the household head	Income from serfdom and houses (AR)	Income from factories (AR)	Merchants' income from trade (AR)	Income from rank (AR)	Total group income (AR)	Number of households	Average income per household (AR)
Aristocrats (all)	17,278,819 (serfdom)	186,991	0	2,180,100	19,645,910	2,717	7,231
Merchants (all)	1,360,648	2,830,254	4,946,700	0	9,137,602	4,068	2,247
Non-hereditary nobles	53,327	10,552	0	48,935	115,814	156	742
Peasant	3,585	295,954	0	0	299,539	130	2,304
Household serf	0	615	0	0	615	2	308
Townsfolk	99,117	38,610	0	4,200	141,927	200	710
Artisans	11,290	7,882	0	0	19,172	19	1,009
Clergy	28,812	0	0	0	28,812	81	356
Foreigners	18,090	0	0	0	18,090	22	822
Soldiers	430	0	0	0	430	4	108
Total for all households	18,857,117	3,382,502	4,946,700	2,223,235	29,419,554	7,399	3,976

Source: see the text and the online appendix.

III. DATASET OF PRE-TAX ESTIMATED AVERAGE INCOMES OF 21 TYPES OF HOUSEHOLDS

We complement our dataset on the 7,399 individual asset-holding households by incorporating information about 21 distinct groups with estimated averaged incomes. To construct this social table, we rely on the occupational composition of Moscow Province, as documented in the sixth Russian census of 1811 published by a team of Soviet historians led by Lubomir Beskrovnyy (1972). Starting in 1724, Russia implemented a poll tax that applied to males from various social backgrounds, including serfs, peasants, merchants, and townsfolk, encompassing individuals of all ages, from infants to seniors. Over the period from 1724 to 1858, the Russian administration conducted ten censuses for population tracking. Beginning in the mid-18th century, these censuses began to collect detailed information regarding the numbers of both male and female serfs, peasants, and townsfolk, thereby offering comprehensive demographic insights into these social groups. While these censuses also contained

some data on personal nobility and clergy, participation in the census by these groups was voluntary, and the recorded information is incomplete. To address these gaps, we have incorporated supplementary historical information about personal nobility, relying on administrative lists to ascertain the precise number of personal nobles (Kabuzan & Troitskii 1971). Additionally, we have utilized the Moscow Registers compiled by Moscow Police in 1811, which furnishes us with thorough demographic data for all major social classes, excluding the clergy, who participated in the census voluntarily. Detailed information on the construction of the various social groups and their average incomes is available in the online appendix. Here we offer only the most important details.

SERFS AND PEASANTS IN AGRICULTURE

Serfs and peasants in agriculture accounted for 56 percent of the province's population. Two-thirds of agricultural workers were serfs. Specifically, the 1811 census recorded a total of 860,566 people involved in agriculture, comprising 290,257 peasants and 570,309 serfs, including both men and women. Although serfs and peasants had different tax obligations, their incomes were similar.

Ivan Kovalchenko and Leonid Milov (1966) categorized the agricultural population into three income groups: lower, middle, and upper. The lower income group, making up around 30 percent of agricultural workers, relied solely on income from farming, including animal husbandry and cultivating the land as perpetual tenants. The middle-income agricultural households supplemented their earnings from farming by providing transport services and engaging in various crafts, such as producing yarn, cloth, or tools at home, in addition to their agricultural activities. The top 10 percent of both peasants and serfs had more land for farming and invested in animal husbandry. Tracy Dennison (2006) even identified some wealthier peasants and serfs in the Central Economic Region who ran small private workshops, like tanneries and distilleries (we found 130 such owners; see Table 4). For agricultural workers not covered in the individual income dataset, we assume they earned money from different sources, including farming, animal husbandry, crafts, and services. Building on available output data we estimate that each adult male worker generated 45.5 AR of income for his household. Moreover, income from services and animal husbandry varied between 50 and 25 AR and 8.2 AR and 0.42 AR, respectively, depending on household size and income level. This further suggests the argued underdevelopment of animal husbandry in Moscow Province at the time. A detailed discussion of the reconstruction of these income sources based on new archival material and prior literature is available in the online appendix.

While census reports provide both the total population and household figures, we only have access to aggregated data. To determine the number of households, we make certain assumptions about their average size. Mironov (2014) indicates that, on average, an agricultural household consisted of

seven family members. This aligns with John Hajnal's (1965) observation that agricultural Russia had high marriage and fertility rates, with households typically being intergenerational, as opposed to the higher levels of neo-locality, celibacy, and lower fertility seen in Western Europe. In addition, we examined archival records of estates owned by the Golitsyn family in Moscow Province.[12] According to this data, households in 1811 had an equal representation of males and females, with adults and infants each accounting for about a third of all household members. Based on these findings, we assume that a typical intergenerational household comprised seven members, including (A) a senior, (B) one male and one female spouse, (C) one adult son aged 14 or older, (D) one adult daughter aged 14 or older, and (E) two infants.

Households varied in size, influenced by the land allocated to them by the village commune, which, in turn, depended on the number of able-bodied men within each household. Archival records from Golistyn's estate in 1811 demonstrated that households cultivated plots of different sizes, with a bimodal distribution. Typically, one male serf cultivated either a one or half desyatina plot (equivalent to 1.09 hectares)[13], and both smaller and larger plots were equally common. Drawing from this data, we classify households as either "larger" or "smaller" based on their allotments. Larger households, with access to bigger plots, could sustain more family members, typically totaling eight people. Conversely, smaller households, tending to smaller plots, could support fewer members and generally consisted of six individuals. This aligns with Mironov's (1990) estimate of an average household size of around seven people.

Our assumptions are as follows: (A) all poor households are considered small; (B) half of the middle-income households are small, and the other half are large; and (C) all top-income households are considered large. We further assume that household size mainly impacts the number of infants and seniors, and that each household includes two male adult workers, typically the father and an adult son (for all steps in calculations see the online appendix).

Table 5 provides a summary of the incomes for low, middle, and high-income tenant farmers, encompassing revenue from agriculture, crafts, and services. It also includes incomes from property and factories of the already discussed property-holding households. The total income of all serfs and peasants in agriculture (excluding the 130 property-holding households) in 1811 amounted to 15,218,275 AR. Notably, since tenant farmers could not operate plots outside of their communes, they had no incomes outside of Moscow Province, i.e., unlike in the case of aristocrats, their within-province and national incomes were equal.[14]

[12] The Department of manuscript of State Historical Museum (OPI GIM), f, 14, d, 1741.
[13] It was a size of one out of three fields. In Moscow Province, the three-field system was the most widespread.
[14] The value is below the income aristocracy obtained from serfdom, including quitrent paid from the serfs' income, because the latter estimate also includes estates located outside of Moscow Province and the income from corvée service.

Table 5: Average incomes of serfs and peasants in agriculture, 4 income groups.

Group	Share (%)	People per household	Number of households	Income from agriculture and animal husbandry (AR)	Income from crafts and services (AR)	Income from property and factories (AR)	Average income per household (AR)	Total income per group (AR)
Poor I	30	6	43,028	91.42	0	0	91.42	3,933,620
Medium I	30	6	43,028	92.84	25	0	117.84	5,070,420
Medium II	30	8	32,271	92.84	50	0	142.84	4,609,590
Rich	10	8	10,755	99.2	50	0	149.2	1,604,646
All groups	100	-	129,082	-	-	-	117.9	15,218,275

Source: See the text. For income data see the online appendix.

INCOMES OF WAGE AND SALARY EARNERS

We also study the incomes of the renumerated workers based on available population census and wage and salary data. Together they accounted for around a third of the province's population. Further information regarding these reconstructions can be found in the online appendix. Specifically, we studied:

(A) Household serfs (*Dvorovye*) who were paid for their services in money (1 income group),

(B) Skilled and unskilled wage workers (serfs in factories, unskilled workers outside of Moscow, unskilled workers inside Moscow, mid-skilled workers, skilled workers),

(C) Civil servants (hereditary nobles, 5 income groups determined by their rank),

(D) Other miscellaneous groups (clergy and soldiers).

IV. INCOME DISTRIBUTION AND INTERNATIONAL COMPARISON

Table 6 presents a social table. It compiles data on 7,399 asset-holding households for which we have the household-level-data (taken from Table 4) with 222,114 households belonging to one of the 21 propertyless household types for which we estimated average incomes (229,513 households in total). To evaluate these results, we express the average incomes of each social group in terms of barebones subsistence ratios, which are useful for studying and comparing impoverished preindustrial agricultural economies (as outlined in Allen et al. 2011). A subsistence ratio of one indicates that the average annual income of an individual was enough to cover the basic calories and essential manufactured goods required for survival. We determined the cost of a contemporary Russian barebones basket for one adult, based on Moscow prices, to be 13.66 AR (see the online appendix for detailed calculations). Moreover, in Table 6, we calculate the average income per person by dividing the total annual income by the total number of people in each category. Our findings suggest that all social classes were able to sustain themselves with the estimated average income. This indicates that we likely haven't underestimated the incomes of serfs, peasants, and wage earners. However, it is worth

noting that the incomes of serfs in manufacturing and household serfs were slightly below the subsistence level, aligning with the common perception of serfdom as an extractive system.[15] Additionally, it is noteworthy that both serfs and peasants involved in agriculture had subsistence ratios similar to those of townspeople, approximately, 1.3-1.5 respectively. Our income calculations are pre-tax, so we have not factored in the taxes levied on serfs and peasants in the basket.

Table 6: Social Table. Summary incomes of all social classes and the total pre-tax income in Moscow Province in 1811

Estate (number of various types of households with different average incomes)	Nr of households with unique-household-level data	Total nr of households including those based on average income group data	Share of total households (%)	Total income (AR)	Share of total income (%)	Population	Income per person (AR)	Subsistence ratio per person
Aristocrats	2,717	2,717	1.2%	19,645,910	38.1%	5,710	3,441	251.9
Merchants	4,067	4,067	1.8%	9,137,602	17.7%	20,458	447	32.7
Personal nobles (5 groups)	156	6,132	2.7%	1,729,389	3.4%	24,528	71	5.2
Serfs and peasants in agriculture (4 groups)	131	129,213	56.3%	15,529,458	30.1%	860,566	18	1.3
Household serfs (1 groups)	2	14,720	6.4%	677,028	1.3%	58,871	12	0.8
Serfs in manufacturing (1 groups)	-	8,058	3.5%	290,088	0.6%	32,238	9	0.7
Townsfolk and artisans (7 groups)	219	36,641	16.0%	2,974,942	5.8%	146,488	20	1.5
Clergy (2 groups)	81	13,550	5.9%	842,772	1.6%	13,550	62	4.6
Soldiers (1 groups)	4	14,393	6.3%	697,867	1.4%	14,393	48	3.5
Foreigners	22	22	0.0%	18,090	0.0%	22	822	60.2
All estates (21 groups)	7,399	229,513	100%	51,543,146	100%	1,176,824	44	3.2

Source: See the text.

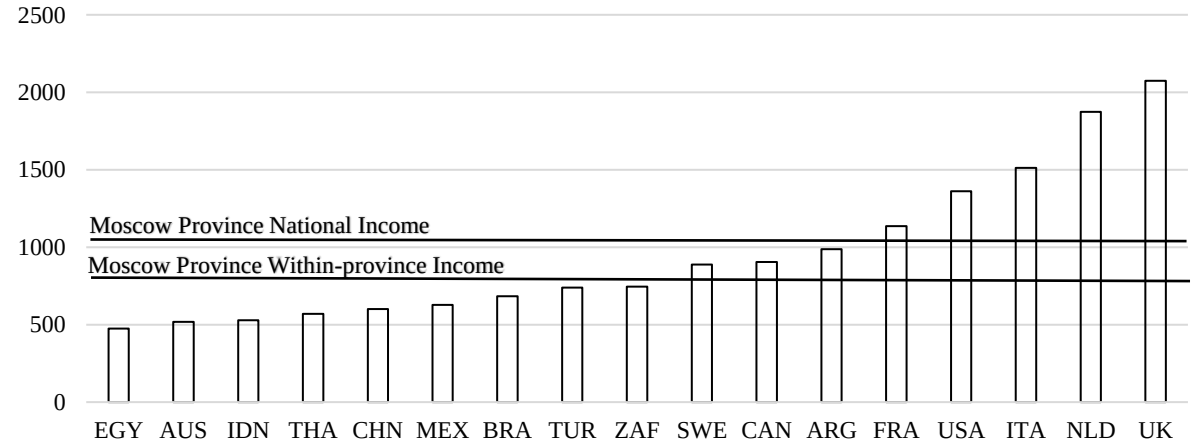
[15] Note that Table 6 does not account for the lower caloric needs of the children and the fact that the household serfs received free lodging and clothing. When using a rescaled basket for a household the subsistence rate per serf household is at the subsistence level.

INCOME LEVELS

The social table yields that the entire population of Moscow Province had a combined pre-tax income of around 51.5 million AR, averaging about 44 AR per person. To place these results in an international perspective and make them consistent with the Inequality Possibility Frontier framework we convert the results into 1990 international purchasing power parity dollars (hereafter 1990$PPP). Specifically, we use the implicit conversion ratio method based on the national costs of a uniform bare-bones basket and equate 44AR to 1012 1990$PPP per capita national income. The details of this conversion can be found in the online appendix. Notably, following the convention, we estimate the national income by accounting for the incomes of the estates belonging to the aristocrats residing in Moscow Province regardless of their location. As discussed, two-thirds of the estates were located outside of the province. To provide a more nuanced picture, we also look at the within-province income, which we estimate at 781 1990$PPP. The number excludes the incomes from outside-province estates and adds the incomes of the emperor from his table lands located in Moscow Province (see the online appendix for details).

Figure 3 puts Moscow Province's income levels into a global comparative perspective. The comparison suggests that Russia might have been located between Western European and East Asian income levels already before widespread industrialization. Consistently with the Little Divergence hypothesis, our findings confirm that Eastern Europe/Russia was behind the economic leaders located in the North Sea Region, Northern Italy, as well as the economically expanding United States of America. The income levels in the province are at par with the national estimates for France, Sweden, Canada, and Argentina. Regarding the Great Divergence, both the national and within-province income of Moscow Province was relatively affluent when compared with India and China.

Figure 3. Global GDP/GDI per capita estimates in 1990$PPP around 1820



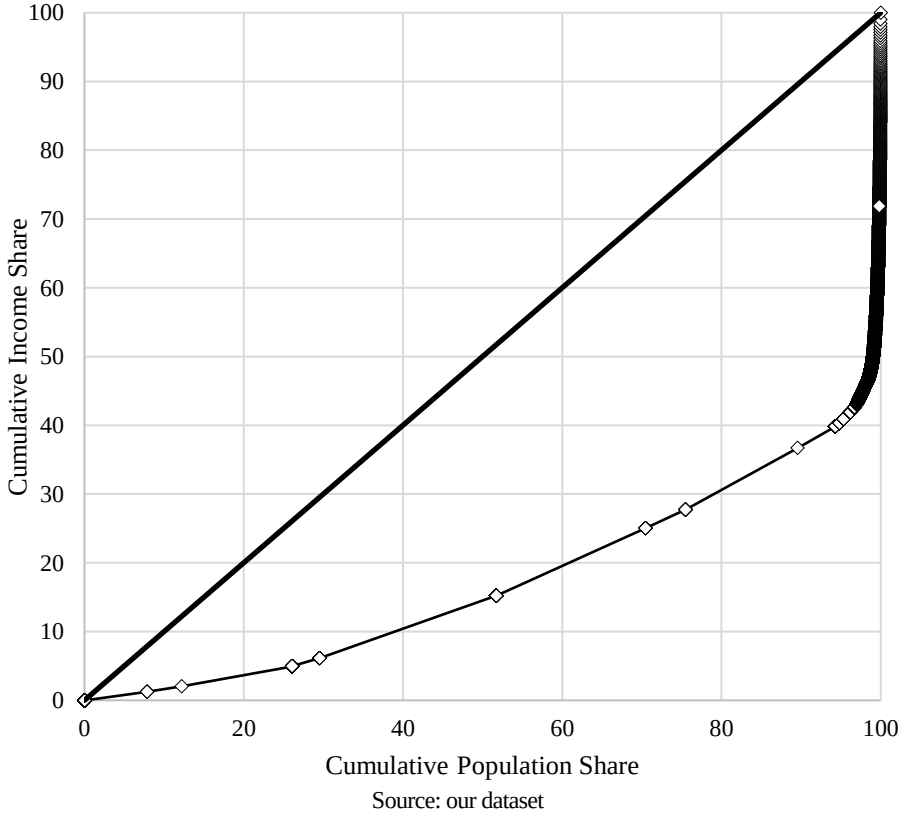
Source: Our calculations for Russia. The data and the selection of countries is based on the "How was Life" OECD report on the history of global income levels (Bolt & Van Zanden 2014).

Ours is not the first GDP/GDI estimate for pre-1861 Russia. Angus Maddison (2001) proposed a "guesstimate" of GDP per capita of the entire territory of the future Soviet Union in 1820 at 688 1990$PPP. However, Maddison's "guesstimate" is not actually based on any Russian data. Furthermore, recently, Elena Korchmina and Stephen Broadberry (2024) investigated output levels in European Czarist Russia and placed it around 950 1990$PPP. Our estimate, based on the income approach, indicates that Moscow Province was slightly richer than the rest of the Empire on average. Because GDP figures based on outcome tend to be higher than those based on income data, those exploratory findings invite further detailed studies of regional inequalities within preindustrial Russia (see Broadberry et al. 2015 for discussion).

PRE-TAX INEQUALITY

The social table indicates that income distribution was heavily skewed. While merchants and aristocrats made up just three percent of the population, they collectively received 56 percent of the total national income. In contrast, serfs and peasants, who constituted roughly two-thirds of the population, received only about one-third of the total national income.

Figure 4: Lorenz curve of the income distribution of the whole population in Moscow Province



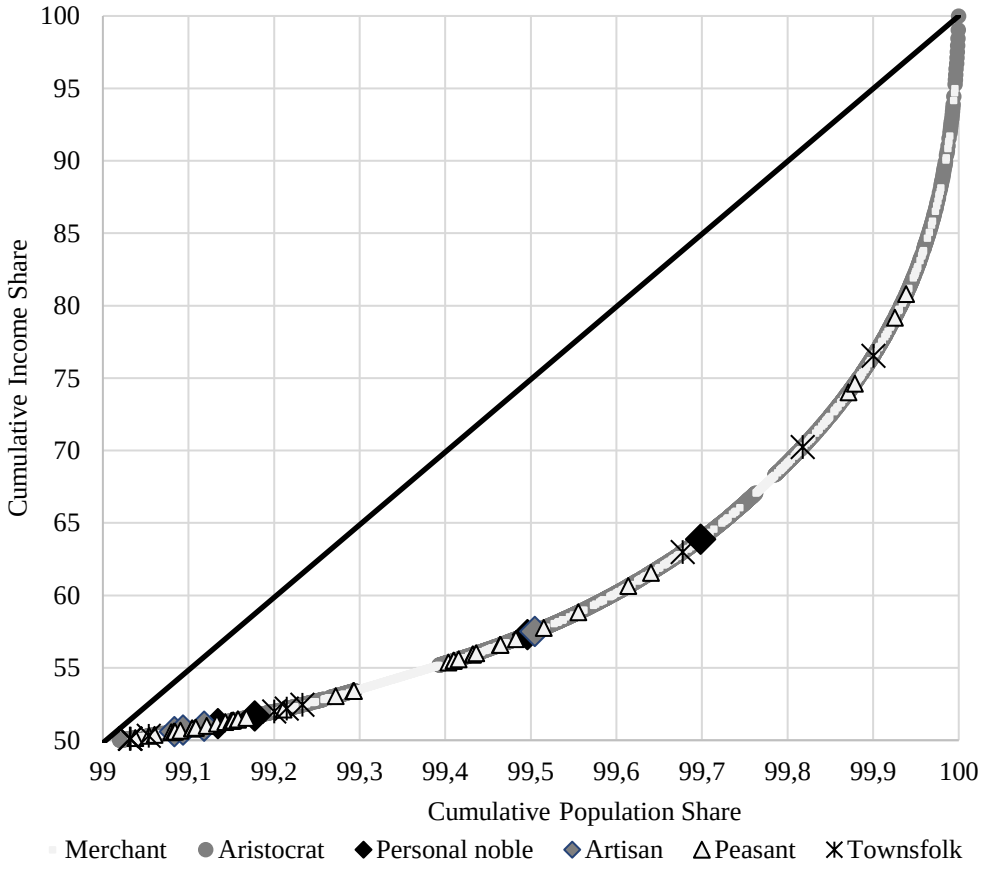
Source: our dataset

Figure 4 presents a Lorenz curve illustrating the income distribution of 7,399 individual households and 21 average income groups. Each square on the graph represents one household or income group. The

figure starkly highlights the concentration of income among the asset-holding classes represented by the household-level data. The top one percent of households claimed a staggering 50 percent of the pre-tax total income. To put this in context, this level of income inequality exceeds that seen in today's Russia, which was estimated at 20 percent for the top one percent in 2015 (Novokmet et al. 2018), although this estimate pertains to the entire country, not just Moscow Province.

In a nutshell, the aggregated income of residents of Moscow Province exhibited extremely high levels of income concentration, reflected by a Gini coefficient of 65 for the distribution within the overall population. Notably, this figure is higher than contemporary observed already high inequality levels in Moscow which for 2004 were estimated at a Gini coefficient equal to 60 (Novokmet et al. 2018). To provide perspective, this level of inequality surpasses that of present-day South Africa, currently the highest in the world (Gini of 63).[16] They were also exceptionally unequal even by the preindustrial standards as Czarist Russian inequality levels exceeded those identified for the colonial economy of Mexico/Nueva España in 1790 (Gini of 62), which was based on coerced labor and resource exploitation. The Gini coefficient based on within-province income was still high at 57 (see the online appendix for detailed calculations).

Figure 5: Lorenz curve of the top 1% of the income distribution in Moscow Province in 1811



Source: our dataset

[16] https://worldpopulationreview.com/country-rankings/gini-coefficient-by-country

Our unique dataset allows us to study the distribution of income within the top one percent of all earners. The Gini coefficient for pre-tax income distribution of this group was exceptionally high at 71. Figure 5 illustrates the cumulative distribution of incomes within the top one percent. This elite group included 1,419 aristocrats, all 123 merchants of the first guild, all 350 merchants of the second guild, and 307 merchants of the third guild who owned factories; 86 peasants, 17 townsfolk (including 4 artisans), 2 personal nobles, and one foreigner (these are household heads). In contrast, the top 0.1 percent primarily consisted of merchants and aristocrats, with only two peasants and one townsman. This suggests that while merchants and aristocrats were the most affluent, entry into Russia's top asset-holding class was not exclusively determined by one's birthright.

As discussed, Steven Hoch (1986) argued that serfs could enter the economic elite using only limited qualitative evidence (see also Ulyanova 2015). We verify this claim empirically and measure the exact scale of the process by analyzing who entered the top one percent of households by income. At first glance, no person with serf status was in the top one percent. However, former serfs could change their status and enter the elite group by becoming merchants. One of the reasons to change the status was that serfs had difficulty accessing credit (see Meshalin 1950 for an example from 1837). The change of status was regulated in the 'Charter Granted to the Cities' published in 1785. Specifically, Article 79 granted serfs who were freed by their landlords the right to relocate to cities. The bureaucratic procedure for transitioning from serf to merchant estate involved securing approval from the merchant corporation of the city where the candidate sought to join the merchant class (conditioned on their capital) and registration of the transition in the region's Treasury Chamber.

We study the merchant census of 1811 that listed the prior social status and residence of the head of each merchant household before they obtained a guild license (Naydenov 1887). We find that between the previous census of 1795 and the new census of 1811, 1,696 new household heads joined one of the merchant guilds. This means that guild membership was not fully restricted to newcomers and around one hundred new household heads on average per year entered the merchant group. Moreover, between 1795 and 1811, 63 percent of those 1,696 newcomers were either formerly serfs (354), household serfs (319), or peasants (393). This indicates that the most underprivileged classes were not entirely barred from obtaining guild membership. However, the advancement from the third to the second or first guild was largely restricted. In the corresponding time period, only three new people on average per year obtained a license to operate in one of the elite guilds. Table 7 details the distribution of the former status of all the first and second guild merchant household heads active in 1811, regardless of when they joined a guild. It yields that in 1811 only 16 former serfs and 20 former household serfs were included in the top one percent of households by income as merchants of the first

or second guild, i.e., only four percent of the elite merchants came from a serf background. Conversely, as much as, 69 percent of the elite merchant household heads originated from merchant households (children of merchants). Put differently, while 52 percent of all aristocrats were in the top one percent, less than 0.0001 percent of the serf population managed to climb the social ladder by entering the elite merchant group.[17] This suggests limited social mobility in Czarist Russia and limited access of serfs to the economic elites. This limited inclusivity of the top one percent contributed to the profound income disparity between the privileged and the underprivileged.

Table 7. Distribution of the status of the heads of merchant households in 1811 by their status before obtaining a guild license

	Total	Merchant	Serf	Household serf	Peasant	Other
1st guild	123	96	3	2	2	20
2nd guild	350	225	13	18	14	80
1st and 2nd	473	321	16	20	16	100

Note: It indicates that 321 people were children of merchants who then purchased their own merchant license. Source: Naydenov 1887.

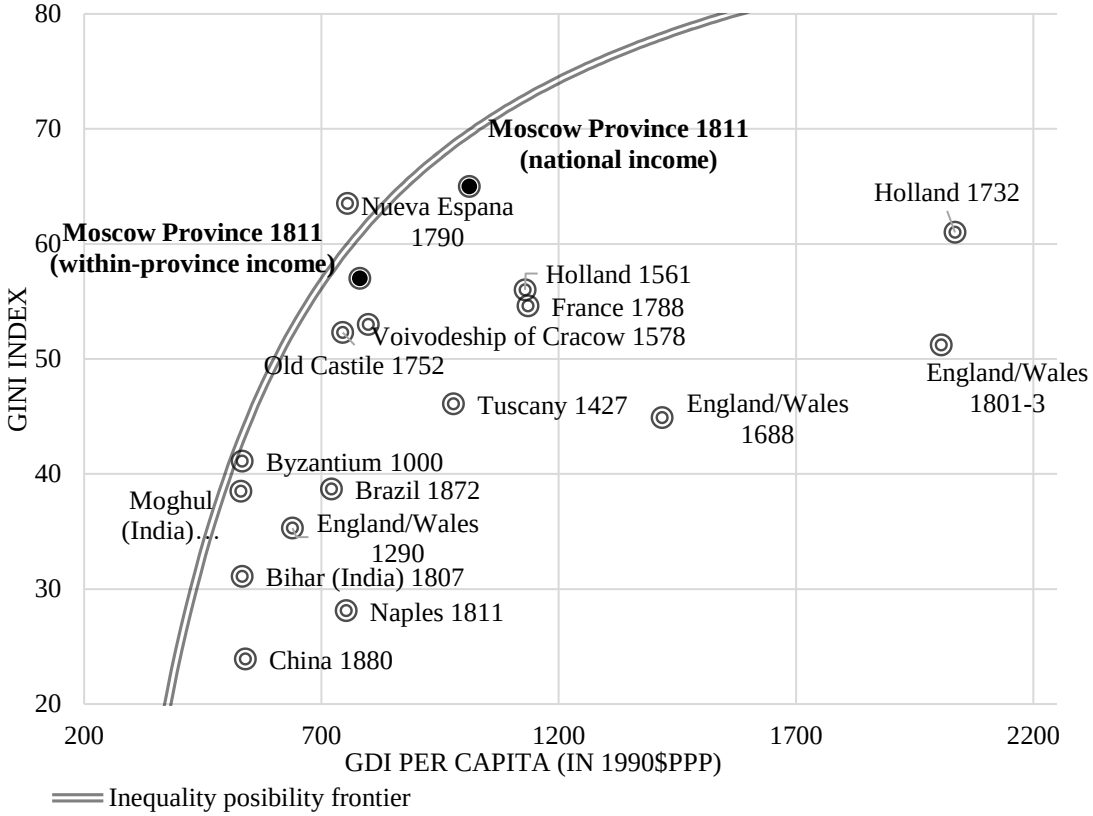
EXTRACTION RATIO

We analyze our findings via the prism of the Inequality Positivity Frontier framework proposed by Branco Milanovic and collaborators (2011). This frontier posits that at every level of per capita income, there is a maximum attainable level of inequality. In their framework, the authors assume that the elites extract the available surplus from the rest of the population. In poor subsistence-level economies, maximum inequality is limited because few resources can be transferred from subsistence farmers to the other social classes. The larger the economic "pie", the more surplus can be extracted while still allowing for subsistence consumption. Therefore, as economies grow, so does the extractable surplus, and the maximum attainable level of inequality. The extraction level is determined by comparing the actual Gini coefficient to the maximum feasible one determined by the frontier. A ratio of one signifies the elite's complete extraction of the available surplus. The framework was designed specifically to study income, distribution, and extraction in poor pre-industrial economies and therefore fits perfectly for the needs of this study. Figure 6 plots the results for both national and within-province incomes in the international comparative framework. It yields that in both cases, the extraction rate was at around 95 percent of the theoretical maximum. This corroborates the conventional view that the Russian serf

[17] An example of a former serf who managed to climb to the elite status was Semyon Ioannikievich Selivanovsky, born in 1772 to a serf family in Dedinovo village. He emerged as a prominent printer and publisher in Moscow during the early 19th century. Apprenticing at his uncle's Moscow printing house in 1785, he further honed his skills in St. Petersburg in 1789. Selivanovsky embarked on an independent career in 1793 by managing the typography of Moscow book trader Zavyalov. Over 60 books were published in his printing house by 1797, showcasing his role as a compiler and editor. Granted freedom in 1797, he joined the merchants of the 3rd guild. Selivanovsky's passion for books transformed his establishment into one of Moscow's finest, featuring a library from 1807 with works by Lomonosov, Novikov, Krylov, and French enlighteners. Operating until Napoleon's entry in 1812, the printing house played a pivotal role in printing an appeal by Governor General F.V. Rostopchin three days before the invasion. Post-Moscow fire, Selivanovsky continued publishing, emphasizing book design, font selection, and vignettes. Noteworthy authors like N.M. Karamzin, K.F. Ryleev, and foreign figures like J.-J. Rousseau and F. Voltaire were part of his extensive publications (Lubavin 1981).

economy was not only very unequal but also highly extractive within the context of its low average per capita income levels.

Figure 6: Scatter-plotted income and inequality levels in a range of preindustrial societies



Source: Our estimations, Milanovic et al. 2011 and Malinowski and Van Zanden 2017.

AFTER-TAX INEQUALITY

Thus far we have analyzed only the pre-tax income. We also study the impact of direct taxation on inequality levels. Most pre-industrial regimes had regressive tax systems that disproportionally affected the disenfranchised population (see Alfani & Di Tullio 2019). Czarist Russia was no exception. Regarding the central-state taxes, peasant male population in Moscow Province[18] regardless of age was subject to 2 AR annual poll tax plus 6 AR *obrochnya podat*[19], so altogether 8 AR. Male serfs paid only 2 AR as a poll tax[20], but were obliged to pay quitrent or perform unpaid labor duties to their landlords. Male townsfolks paid 5 AR poll tax.

Regarding the provincial taxes, the serfs and peasant households residing in the rural areas were required to pay an additional 0.16 AR tax per male and 0.25 percent on the value of their sales.[21] In

[18] Starting from 1797, the Moscow region was assigned to so-called provinces of the second group: Overall, there were four groups, of which the first group (provinces with black soil) paid the most tax (PSZ 18278).
[19] In 1768, obrochnaya podat was 2 rubles (PSZ 13194). In 1797, it was increased to 3.5 rubles (PSZ 18278). In 1810, it was increased to 6 rubles (PSZ 24116)
[20] PSZ 24116
[21] These numbers were calculated specifically for Moscow province based on the budget of 1810. (RGIA f 1281 op 11 d. 82)

total, according to our calculations detailed in the online appendix, the tax burden for peasants was around 25 percent and for serfs around seven of their pre-tax income. This brought their post-tax incomes close to the subsistence level (see the online appendix).

Regarding the elite incomes, each merchant was required to pay a one percent wealth tax on the declared capital to the central-state budget and a 0.25 percent tax on the declared capital to the provincial budget (1.25 percent in total). Additionally, everyone who owned a house had to pay 0.5 percent on the value of their real estate. There was no tax on the income from the sales of factory production. Since wealth was the source of merchant income, we include this wealth tax when calculating the post-tax income (PSZ 24116). Lastly, aristocracy, personal nobles, and clergy were exempted from taxation. Therefore, in general, the elites paid relatively much lower taxes. The exception was the special income from property tax studied in this article, which ranged from zero to ten percent depending on the declared income (see the online appendix).

According to our calculations detailed in the online appendix, the population of Moscow Province paid around 3,171,076 AR in direct taxation (general population 2,489,622, merchants an additional 523,625 from capital tax, property holders 157,829 from the regular house tax) or eight percent of the within-province income (this excludes the special tax on aristocracy). Due to the regressive nature of taxation, the Gini coefficient of income distribution rises from 65 (pre-tax) to 67 (post-tax). In 1811, the aristocracy paid 1,115,403 AR in the special tax. Once we also account for the equalizing effect of this special tax on the elite, the Gini coefficient of post-tax income distribution drops from 67 to 66. Those small shifts in the level of the Gini coefficient indicate that taxation did not determine the levels of income inequality but that the high inequality levels were driven by the feudal ownership land structure, resulting in serfdom (see the online appendix for the compilation of all the Lorentz curves).

V. EMANCIPATION AND INEQUALITY TRENDS IN THE 19th CENTURY

If serfdom was associated with high concentration, inequality, and extraction levels, what was the impact of emancipation? The emancipation of the serfs in 1861 granted personal freedom to all former serfs, who could no longer be sold, bought, leased, punished, or imprisoned by their landlords. The obligations of the former serfs to their landlords were fixed and the aristocrats could no longer demand any unpaid corvée. Markevich and Zhuravskaya (2018) argued that the discontinuation of the ratchet effect motivated the former serfs to increase productivity and invest in their human capital. Specifically, the authors documented a steady rise in agricultural productivity and showed an effect on the living standards proxied by height after 1861.

However, emancipation did not translate into an immediate boost to economic growth. According to Broadberry and Korchmina (2024), the GDP per capita in Russia was stagnant between 1800 and 1880 while the size of the economy increased only slightly between 1880 and 1910 (based on Gregory 1982). One possible explanation for this is that emancipation was followed by land reform that perpetuated the communal system of land titles, and former serfs did not end up owning the land directly. Specifically, the land reform implemented over the next 20 years after 1861 ended feudal land ownership structures. Aristocrats gained full ownership rights to their lands for free from the emperor and transferred the land rights to village communes in return for redemption payments. 80 percent of the land value specified in the buyout contract signed between the landlords, village communes, and the state was financed by the state in the form of a 49-year state loan to each village commune (Khristoforov 2011). The effects of these legal constraints on Russian agriculture have received substantial attention in the literature (Castañeda Dower & Markevich 2017; Chernina et al 2014; Gregory 1980; Nafziger 2010, 2016). Most notably, because village communes needed to repay the debts incurred to buy out the land, they maintained mobility restrictions on their members. Therefore, emancipation and land reform did not "free" the former serfs entirely. According to Alexander Gershenkron (1965), the mobility restrictions imposed by village communes on their members after emancipation undercut the supply of factory workers and stifled the growth of the industrial sector and the formation of the industrial elites. While it restrained urbanization and industrialization, the restriction was beneficial to the aristocrats who retained the ownership of their demesnes but needed to hire paid agricultural workers to operate them (see Markevich & Zhuravskaya 2018). However, Nafziger (2012) demonstrated that the restrictions lessened by the end of the 19th century.

Table 8 investigates the distributional impact of emancipation and land reform by comparing our new results for Moscow Province with the estimates available for nineteenth-century (European) Russia. Lucas Chancel and Thomas Piketty (2021) studied the data available in the World Inequality Database (WID) and suggested that inequality levels in Russia remained roughly stable between 1820 and 1920. In fact, there was no significant change in income distribution levels between 1850 and 1880, i.e., directly before and after emancipation and land reform. The inequality levels only slightly rose, rather than declined, between 1880 and 1920. This trend from stagnation to a slight increase corresponds broadly with the abovementioned trends in economic growth identified by Broadberry and Korchmina (2024). This suggests that the Russian nineteenth-century inequality levels might have been more impacted by the shifts in income levels rather than by the emancipation whose effects were muted by the land reform.

We reinforce those findings based on the national income in entire (European) Russia with a comparison of the within-province income distribution in Moscow Province. We compare our estimates with those published by Lindert and Nafziger (2014). The comparison identifies that the inequality levels remained roughly the same between 1811 and 1904. When taken by face value, Gini coefficients of the income distribution rose marginally from 57 to 59 while the measures of top income dropped slightly. This lends further support to the supposition that the effect of emancipation and land reform on inequality levels was limited. However, since the Russian economy grew in the last decades of the 19th century, the Maximum Feasible Inequality determined by the Inequality Possibility Frontier also increased. For this reason, the Extraction Ratio in 1904 was significantly lower than in 1811, despite similar inequality figures (see Table 7). This suggests that while emancipation and land reform did not dramatically reduce the income levels, abolishment of serfdom might have prevented further extraction of surplus. This speculative conjecture based on our exploratory analysis requires further detailed investigation.

Table 8. Comparison of the top income share in Moscow Province in 1811 and 1904

	National income 1811 Moscow Province (this article)	National income in Russia (WID)				Within-province income in Moscow Province	
		1820	1850	1880	1905	1811 (this article)	1904 (Lindert & Nafziger)
Top 0.1%	23%	-	-	-	-	18%	-
Top 1%	50%	-	-	-	-	39%	38%
Top 5%	59%	-	-	-	-	49%	47%
Top 10%	63%	44%	45%	45%	48%	54%	54%
Bottom 50%	14%	18%	18%	17%	15%	18%	-
Bottom 40%	10%	-	-	-	-	13%	13%
Gini	65	-	-	-	-	57	59
Extraction ratio	95%					94%	75%

Note: The 1904 estimate of domestic income and its distribution by Lindert and Nafziger (2014) is based on the 1897 official population census (perepis') and the government Land Census conducted in 1905 that accounts only for the size of the estates but not for the differences in productivity between them. Instead, it relies on a fixed average return on the land's purchase value. This differs from our 1811 estimate based on direct income declarations by the landowners. Moreover, the 1905 land ownership survey consolidated the different holdings of each resident individual landowner. Notably, the 1905 Land Census asked how much land each landlord owned privately. According to Lindert and Nafziger, this was aggregated at the provincial level and represents domestic income, i.e., the landowners reported the landownership for each province separately. Moreover, the extraction ratio for 1904 was calculated using the GDP per capita estimate for Russia from the Maddison Database based on the work by Gregory (1982). Due to the lack of regional estimates, we conservatively assumed that Moscow Province was 10 percent richer than Russia on average.
Source: Our estimations, Lindert & Nafziger 2014. Maddison Project Database. World Inequality Database (WID). https://wid.world/data/#countrytimeseries/sptinc_p0p50_z;sptinc_p90p100_z/RU/1905/2021/eu/k/p/yearly/s

DISCUSSION AND CONCLUSION

Modern-day Russia is one of the world's most unequal societies dominated by a narrow economic and political elite. This article traced back high levels of inequality and income concentration by the elite to the beginning of the 19th century. The existing evidence begins to form a picture of the persistence of high inequality levels in Russian society with the equality under communism in the 20th century being the exception to the persistently-high disparity levels. The high levels of inequality and surplus extraction in the early 19th century were associated with the institution of serfdom. We demonstrated that serfdom generated vast incomes for the elite and that opportunities for economic advancement in the country were restricted, with only 36 former serfs managing to reach the top-tier income group. Put differently, while serfs were 56 percent of the total population, they accounted only for 0.003 percent of the elite. While agriculture in Russia in the early 19th century remained relatively unproductive, by Western European standards, it was by far the largest sector of the economy due to the underdevelopment of services and industry. However, due to the high extraction levels in agriculture, despite the sector's low productivity, serfdom was not only the most common source of income among the elite but also accounted for a high percentage of the national income. Industry remained too underdeveloped to form an alternative base for elite incomes. Moreover, while *barshchina* and *obrok* were the main serf duties, most landlords levied additional fees and fines for, for example, passports, marriage licenses, household separation, transfer of lands, and military exemptions that were most likely not included in their income declarations. This suggests that the extractive effects of serfdom were even more significant. Those findings and discussions inspire further important questions regarding the persistence of serfdom and high inequality and extraction levels.

One of the intriguing questions raised by our research is how it was possible to maintain such a high level of extraction and economic immobility without rebellion and with a low level of state enforcement. This becomes particularly important when considering that the economy was generally poor and the territory huge. While mass protests against serfdom were not common, there were instances of both active and passive forms of rebellion. Active protests by the serfs often occurred during changes in ownership, typically when a landowner passed away, but they were sporadic and ineffective. The extreme forms of resistance involved the assassination of landowners. For instance, during Catherine the Great's rule from 1762 to 1796, Moscow Province saw the murder of 30 landowners, along with five attempted assassinations. Moreover, from 1835 to 1854, incomplete data from the Ministry of Internal Affairs indicates that on top of 62 failed assassination attempts, 131 landowners and 21 estate managers were killed (Lutchitski and Milukov 1895). If the discontent was present, why did not it transform into an active rebellion?

This issue becomes particularly perplexing when considering the limited enforcement mechanisms in Russian society. One key indicator of enforcement is the measurement of the state capacity, often represented by the number of state officials per 1,000 people. According to Stephen Velychenko (2001), in 1795, the ratio of state clerks to the civilian population in Russia (1:1,357) was 25 percent lower than that in European countries (Austria, Britain, and Prussia, 1:1,833). Moreover, as demonstrated by Elena Korchmina (2017), Russian officials were spread over a much larger Russian territory, which made them struggle with tax collection.

Ivan Lutchitski and Pavel Milukov (1895) present a possible explanation of serf obedience despite limited enforcement. According to the authors, serfs regarded landowners as servants of the emperor, whom they respected. According to this perspective, the serfs viewed their subordination as a distinct form of compensation provided by the czar in exchange for the nobility's service. Specifically, in the absence of the effective state bureaucracy, the aristocrats collected high rents from the serfs in exchange for providing public goods (e.g., Hoch 1986). For example, because Russian agriculture faced extreme climatic conditions resulting in frequent bad harvests, landowners were expected to step in to provide a minimum subsistence level and seeds for the next harvest.

Another possible explanation for the lack of serf disobedience is the absence of enforcement from the central state. Recent research indicates that basic administrative operations such as defining and protecting property rights, collecting taxes, enforcing contracts, regulating access to communal resources, and handling complaints for abuses of power were not clearly defined or consistently applied. This created a murky environment in the rural economy where rules were ambiguous and inconsistently enforced (Dennison, 2023). In this ambiguous zone, power was shifted away from institutional structures to local figures of power, regardless of their status. This allowed powerful serfs to exploit others, as Tracy Dennison (2023) and Andrey Gornostaev (2021) have demonstrated. Consequently, equilibrium was maintained at a local level where the so-called "serf Gods", i.e., serfs with a high degree of influence, preserved the status quo, often supporting high inequality.

Moreover, if there was no widespread serf rebellion and the elites profited from serfdom, why was there emancipation? According to Hoch (1986), the serf population declined in the first half of the 19th century, which contributed to its demise. Conversely, scholars starting with Lenin have argued that serfdom was abolished due to the declining profitability of the already meager agriculture in an attempt to increase yields (Lenin Complete volume vol. 20 p. 173). At the same time, Igor Khristofov (2002) showed how the nobility resisted the abolition of serfdom. Lastly, Khristoforov (2011) claims that emancipation was initiated by the elites, particularly by Emperor Alexander II and his supporters to modernize the country. Our research contributes to this open debate by

emphasizing just how much the elite profited from serfdom. More research is needed to explain the dynamics of continuity and change of this extractive institution.

Lastly, why did the inequality levels remain high even after emancipation? In this article, we tentatively linked the persistently high inequality levels in the 19th century despite emancipation to low levels of economic growth, as well as the land reform that effectively forced former serfs to remain in the agricultural sector to pay back the loans incurred by their village communes to buy the land from their former aristocratic landlords. This is parallel to the emancipation experiences from other countries that did not translate into the empowerment of the underprivileged group. For example, the first unsuccessful attempt to end serfdom in Poland in the late 18th century envisioned that former serfs would "*lose their shackles together with their boots*" by gaining legal autonomy but also losing the right to use the land, thus transforming them into landless wage workers. This is also broadly similar to the emancipation of slaves in many Western societies that compensated the former slave owners for their loss but often put former slaves in a continued economic dependency on their former owners as so-called "wage slaves" with limited economic agency. In the present-day United States of America, the legacy of slavery continues to have a profound impact on the distribution of economic assets (O'Connell 2012). Similarly, Buggle and Nafziger (2021) identified that the legacy of serfdom continues to have a negative impact on developmental outcomes. Our research invites a further study into the exact mechanisms via which the legacy of serfdom persisted even after its emancipation including a range of societal, political, cultural, and economic factors.

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ONLINE APPENDIX A. ADDITIONAL GRAPHS AND TABLES

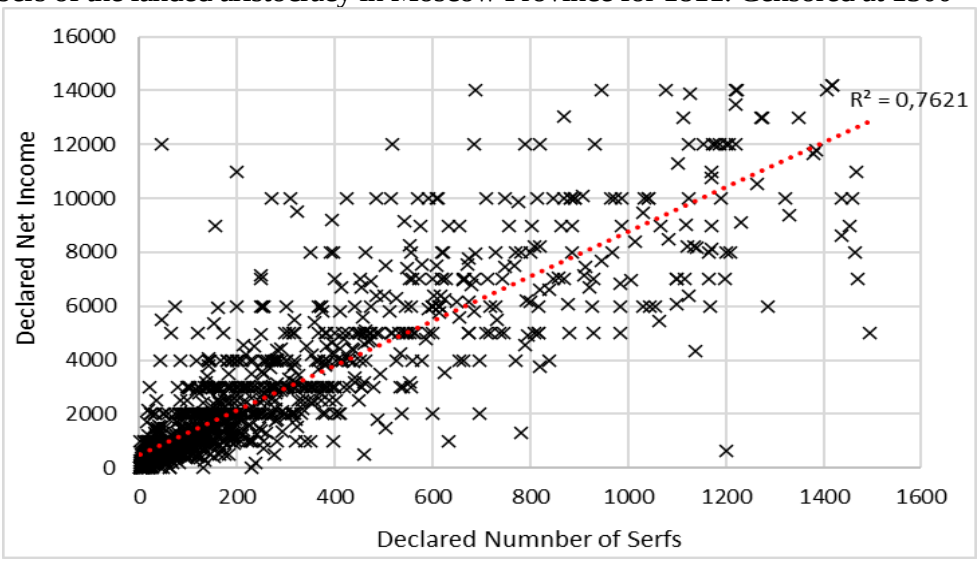
Table A1. The share of cumulative income owned by each decile of the distribution

	All 2,717 aristocratic households	All 7,399 elite asset-holding households
Bottom 10%	0%	1%
Bottom 20%	1%	2%
Bottom 30%	2%	3%
Bottom 40%	4%	5%
Bottom 50%	7%	6%
Bottom 60%	11%	9%
Bottom 70%	17%	12%
Bottom 80%	27%	20%
Bottom 90%	42%	35%
Top 10%	58%	65%

Table A2. Threshold income for each decile (before tax)

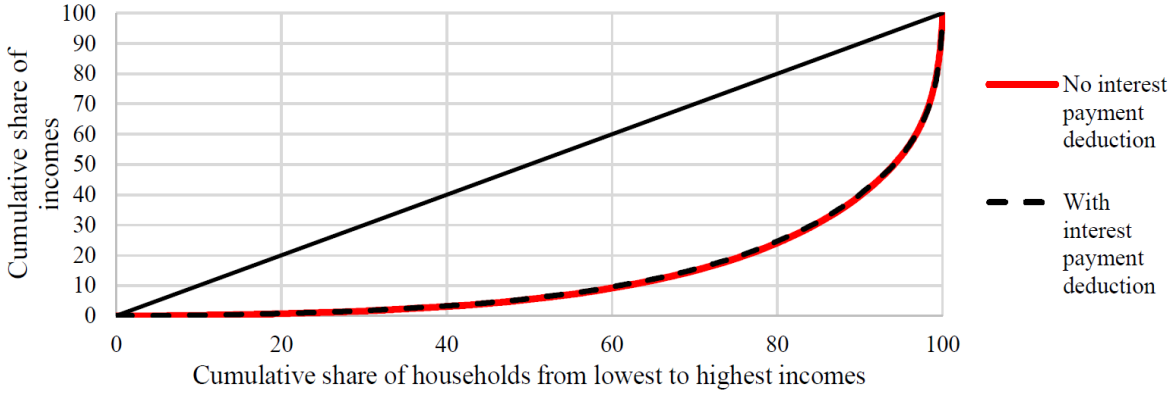
	All 2,717 aristocratic households	All 7,399 elite asset-holding households
1 Decile	400AR	500AR
2 Decile	700AR	560AR
3 Decile	1,000AR	560AR
4 Decile	1,500AR	560AR
5 Decile (Median)	2,285AR	600AR
6 Decile	3,546AR	1,100AR
7 Decile	5,539AR	2,060AR
8 Decile	8,656AR	4,000AR
9 Decile	15,310AR	9,100AR

Figure A1: Correlation between the number of male serfs and the incomes from property declared by the members of the landed aristocracy in Moscow Province for 1811. Censored at 1500



Source: our dataset.

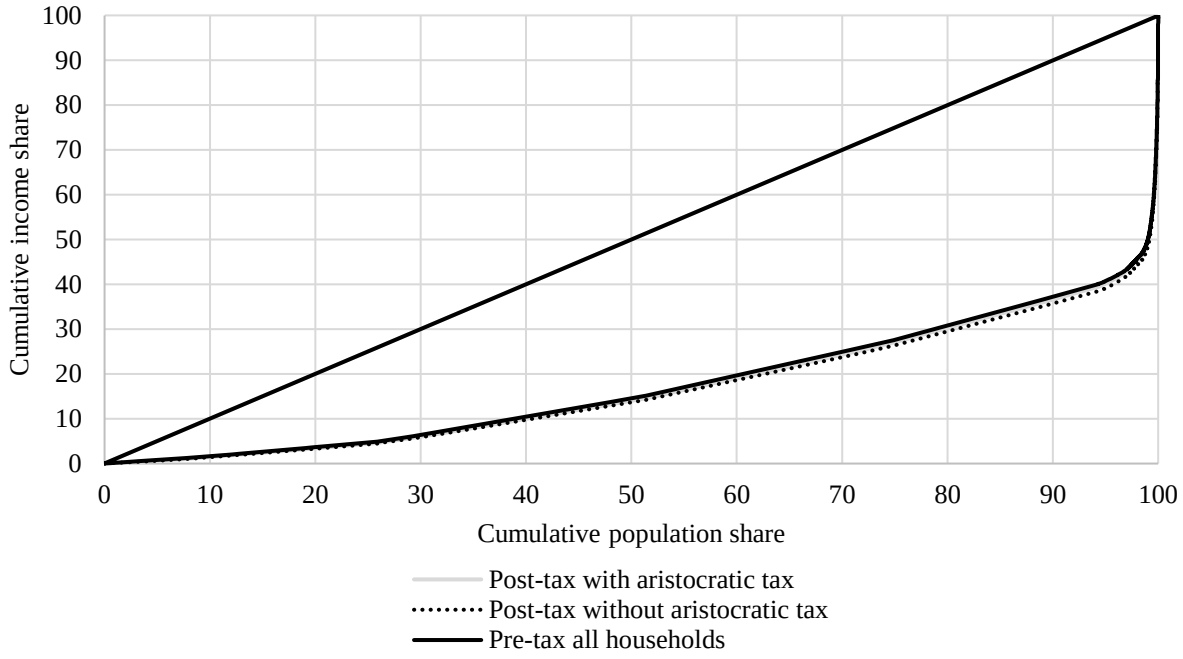
Figure A2: Similarity between the Lorenz curves of the aristocratic incomes from land consisting of serf duties with and without interest on debt payments deduction



Source: see the text.

Note: The taxpayers were allowed to deduct their interest payments on outstanding private loans and state credits when calculating their taxable income. The tax declarations indicate both the gross and net incomes before and after the deduction. All of our calculations are based on gross income. The conventional knowledge propagated by popular works of fiction and based on anecdotal evidence is that the Russian aristocracy was deeply indebted (see Shovlin 2006). However, our new archival information based on complete tax records shows that interest payment deductions (and therefore debts) were, in fact, limited. According to the tax data, only 594 (22%) aristocratic households made a deduction. Jointly, as little as 1,438,361AR (8% of income) was deducted as interest on debt payments. Figure 3 below compares Lorenz's curves of the income distribution of gross and net incomes and demonstrated that, contrary to the conventional knowledge, the debt had no distributional impact, and its deduction did not change the income distribution.

Figure A3: Similarity between the Lorenz curves of pre- and post-tax incomes



APPENDIX B. INCOME FROM INDUSTRY

Table B1: Industrial profits by branch in 1811 according to the census of 1809. Profit margins are based on the 1805 data

Branch of industry	Russian names	Number of factories in 1809	Gross revenue in AR in 1809	Profit in AR in 1809 using profit rate from 1805	Profit margin in 1805
leather	кожевенное	93	942,296.00	489,993.92	0.52
chemical (paint making production)	красочное	7	32,025.00	3,202.50	0.1
copper production	медный	13	396,360.00	118,908.00	0.3
textile	мишурная	2	2,695.00	377.30	0.14
soap and candle production	мыловаренное, свечное	2	116,136.00	11,613.60	0.1
paper production	писчей бумаги	6	159,840.00	15,984.00	0.1
neckwear production	платошная	1	3,840.00	1,382.40	0.36
galloon making production	позументная	14	559,510.00	223,804.00	0.4
cloth production	полотняное	19	579,232.20	173,769.66	0.3
sulfur production	серные	1	4,500.00	450.00	0.1
calico production	ситцевое и миткалевое	51	1,780,385.50	721,056.13	0.405
woolen production	суконное	46	580,962.40	173,707.76	0.299
snuffbox	табакерочное	1	7,250.00	761.25	0.105
vinegar production	уксусных водок	1	1,500.00	307.50	0.205
silk production	шелковое	178	3,602,088.00	1,458,845.64	0.405
hat production	шляпное	11	444,225.00	46,643.63	0.105
Total		446	9,212,845.10	3,440,807.28	

Source: RGIA, f. 16, op. 1. D. 3

Note: The source also details the branch of the industry, the volume/number of produced and sold goods, the number of employed workers, and the factory's equipment. To calculate the gross revenue generated by each factory for the owner, we multiplied the volume/number of sold goods by their 1811 prices based on the Moscow Newspaper (*Moscovskie Vedomosti*).[22] We calculated the profit margin for every industry using the self-reported revenues and costs of 200 factories submitted in 1805 (RGIA Russian State Historical Archive — St Petersburg F. 16. Op. 1. D. 3.). The margin varied between 52 percent in the leather to 10 percent in the chemical industries. We use this profit margin based on the 1805 data to calculate the profits from sales in 1811 (see Appendix). The tax source does not account for the distilleries. The number of factories in 1809 is consistent with the number of factories according to the 1795 sources.

[22] Prices for missing products such as sulfur (*sera*) taken from Prieskurant of 1811, a price list published by the government.

APPENDIX C: INCOMES OF SERFS AND PEASANTS

To reconstruct the income of serfs and peasants from agriculture, we look at the data on agricultural output compiled by Kovalchenko and Milov (1966). The authors calculated how much rye, oats, buckwheat, wheat, and pea was harvested by one adult male. According to their calculations, oats were by far the most common crop, while the importance of wheat was marginal. This demonstrates that Moscow Province's agriculture focused on low-value grains. To calculate the exact incomes from agriculture, we compiled grain prices from the Moscow Gazette (*Moskovskie Vedomosti*) in 1811 and computed the average price. Table C1 compiles the information and yields that one male adult contributed 45.5 AR income from agriculture to the household. We assume that both large and small households had two male adult workers. Thus, the annual income of tenant farmers household from agriculture (crops) was 91 AR.

Table C1: Agricultural output per one male adult worker

Grain	Output in *chetvert*	Price per *chetvert* (AR)	Income from harvest (AR)
Rye	2.42	1183	28.64
Oats	2.76	4.42	12.21
Buckwheat	0.13	16.30	2.12
Wheat	0.10	21.00	2.10
Pea	0.03	15.67	0.47
Total			45.50

Sources: Kovalchenko & Milov (1966, p. 75), Moscow Gazette 1811/1812.

Notably, this does not include profits from husbandry which in Russia was poorly developed due to the lack of pastures (Kovalchenko & Milov 1966). To account for this, we use the data on the animal stock in different types of agricultural households compiled by a contemporary statistician, Sergei Chernov (1812). Following Malinowski and Van Zanden (2017), to translate the animal stock to flow data on annual incomes we divide the stock by the average life-span of each animal taken from their article and multiply it by its price (*Moskovskie Vedomosti 1811*). We assume that horses were only used as input in agricultural production and transport services and were not sold for income. Table C2 shows the estimated incomes from animal husbandry per household type. It indicates that, in the case of the rich peasants, animals were only 10 percent of their total income from agriculture. This is consistent with the conventional knowledge that Russian agriculture was relatively underdeveloped vis-à-vis the West (see Allen 2000). It also corroborates the abovementioned dire assessment of the state of Moscow Province agriculture as reported by its Governor to the Ministry of the Interior in 1810.

Table C2: Estimated incomes from animal husbandry

Household	Stock of horses (used as input)	Stock of cows (1= 0.6 AR annual income)	Stock of sheep (1= 0.08 AR annual income)	Stock of pigs (1= 0.2 AR annual income)	Total income from the stock (AR)
rich	8	10 (6 AR)	15 (1.2 AR)	5 (1 AR)	8.2 AR
middle	2	2 (1.2 AR)	3 (0.24 AR)	2 (0.4 AR)	1.84 AR
poor	1	1 (0.06 AR)	2 (0.16 AR)	1 (0.2 AR)	0.42 AR

Note: Price for sheep was not available. In 16th century Poland, one sheep was worth half a pig. We assume the same relationship. See Malinowski and Van Zanden 2017.

Regarding the income from crafts and services, Kovalchenko and Milov (1966) argued that households could expect it to be between 25 and 50 AR. We assume that larger households have access to more labor and human capital (presence of seniors). We expect that the productive output of the smaller households was smaller than that of the larger ones. For convenience, we assume that the smaller households of six people from the middle-income group earned an additional 25 AR from crafts and services, while the larger households of eight people from the middle and top-income groups earned an additional 50 AR.

APPENDIX D: WAGE AND SALARY EARNERS

HOUSEHOLD SERFS (*DVOROVYE*)

The majority of the aristocrats lived in Moscow. The elite employed many household servants who lived in the city and came from their countryside estates. Next to lodging, these servants received monetary compensation for their work. They did not receive boarding and had to purchase food with their salary. According to the census of 1811, there were 58,871 household serfs in Moscow. Their cohabitation with the employers prohibited the formation of multigenerational households with seniors typical of the countryside. According to the records of the Goltysin family for 1780 the *dvorovye* families/households in their city estates in the 1780s were two to five people (RGADA, f. 1204, op. 1, d. 19330). We assume that the *dvorovye* lived in households of four, i.e., two parents and two children, with both parents being employed in the service. Due to their low annual salaries, different assumptions would put this group much below the subsistence level (see Table 7 in the main text). This assumption indicates that there were 14,718 *dvorovye* households (58,871 divided by 4). To identify the income of household serfs, we collected new archival data on annual salaries paid for different services for 1810 and identified that one household serf earned 23 AR per annum (RGADA, f. 1204, op. 1, d. 19330). This implies that a household with two such employees earned 46 AR. In total, the whole group had a combined income of 677,028 AR.

WAGE WORKERS (SERFS IN MANUFACTURING AND TOWNSMEN)

The census of 1811 combines information on various groups of wage workers. Regarding the unskilled workers, these were (A) townsfolk in Moscow (9,332 people), (B) townsfolk outside of Moscow (34,289), (C) peasants who work in the factories in Moscow (*masterovoi,* 1,900 people), and (D) serfs who worked in the factories belonging to the aristocracy (8,058). Regarding the mid-level skilled workers, the census details (E) 14,628 craft guild members who did not have a permanent place with the guild and (F) 1,081 coachmen (*yamtshiki*). Regarding the skilled workers, the census lists (G) 3,508 permanent craft guild members/masters (*tsekhovoi*); (H) 880 academics; (I) 2,844 clerks, and (J) 876 medical personnel. Notably, groups A and B list a social class rather than a profession. This implies that the census lists all the members of a household, not just the breadwinner and that those groups need to be divided into households. On the other hand, groups C–J count specific professions. In those cases, we assume that the census only listed the heads of households with that occupation. Following Malinowski and Van Zanden (2017), we assume that non-agricultural workers formed nuclear households of four people with just one breadwinner. In total, we count 44,680 households.

To proxy workers' incomes, we look at the annual wages of weavers in a range of textile manufacturers located in Moscow (Tugan-Baranovskii 1922, p. 147). A male weaver could earn 36, 45, 48, 79, 94, and 120 AR per year depending on qualifications. These salaries are consistent with the high skill premiums identified for Eastern Europe by Malinowski (2016b). We assume that the lower three values (36, 45, 48 AR) are indicative of the salary of the unskilled workers and that the unskilled workers outside of Moscow (groups B and D) all earned the lowest unskilled wage, i.e., 36 AR. We divide the unskilled workers in Moscow (groups A and C) into three equal size groups and assume that each of the two workers in a household earned 36, 45, or 48 AR. We divide the mid-skilled households into halves that earned 79 and 94 AR each. We assume that all skilled households earned 120 AR annually. On top of that, we include 200 individual townsfolk and 7 artisan household from the dataset. We assume that as factory and property owners they did not perform any wage labor except for four individuals who, according to the tax data, were employed in the civil service at rank 15 (we already accounted for that income of 100 AR per townsmen in Table 3 in the main text). In sum, we estimate the incomes from unskilled, mid-skilled, and skilled (non-household-serf) wage work at 3.3 million AR (see online appendix for tabulated numbers).

Table D1: Workers' annual income including townsmen and serfs in manufacturing

Group	Number of households	Household's average income (AR)	Combined annual income (AR)
Unskilled workers outside of Moscow (B&D)			
Serfs in factories (group)	8,058	36	290,088
Unskilled workers outside of Moscow (B&D) (group)	8,572	36	308,592
Unskilled workers inside Moscow (A&C)			
Townsfolk (individuals)	200	1126	141,659
Top 33.3% (group)	1,344	48	64,512
Middle 33.3% (group)	1,344	45	60,480
Bottom 33.3% (group)	1,344	36	48,384
Mid-skilled workers (E&F)			
Top 50% (group)	7,855	79	620,545
Bottom 50% (group)	7,855	94	738,370
Skilled workers (G-J)			
Artisans (individuals)	19	1,009	19,172
Skilled workers (G-J) (group)	8089	120	970,680
Total	44,680	75	3,262,482

Source: see the text.

CLERGY, FOREIGNERS, AND SOLDIERS

The census identifies 3,508 clergymen that lived in Moscow and 10,029 who lived outside. The majority of them were monks paid by the state. For convenience, we assume that they did not form households. According to the books of revenues and expenditure (RGADA f. 1204, op. 1. D. 19329) clergy outside of Moscow received annual remuneration of 40 AR. For clergy within Moscow, we assume that they received the equivalent of the highly skilled wage, 120AR. Moreover, 81 clergymen declared individual income from real estate. In total this group's income was 850,932 AR.

Furthermore, according to the census, there were 14,393 soldiers. We assume they were all male and single. According to the books of revenues and expenditure (RGADA f. 1204, op. 1. D. 19329), they earned an annual salary of 48.5 AR. Moreover, four of them reported income from property (no factories). In sum, the soldiers earned 698,491 AR. Lastly, 22 foreigners declared income from property (18,090 AR in total). They owned no factories. We assume that they did not form households and had no other sources of income.

NON-HEREDITARY NOBLES (PERSONAL NOBLES, *LICHNYE DVORYANE*)

Non-hereditary/personal nobles were civil servants who occupied ranks 14 to 9 in the Table of Ranks. In comparison with the hereditary nobles, this group had no aristocratic origins. Vladimir Kabuzan and Sergei Troitskii (1971) compiled a detailed administrative list of all public officials in Russia in 1811. According to their data, there were 6,131 personal nobles in Moscow Province.

All civil servants were male. We assume that they led one household of four each. As discussed, the civil servant salaries were standardized by the government and depended on rank.[23] 156 personal nobles submitted a tax declaration that stated their rank. Unfortunately, we have no individual data on the ranks and incomes of the remaining 5,975 personal nobles. Since Kabuzan and Troitskii (1971) only published aggregate data, we do not know the exact distribution of the ranks between the remaining personal nobles. We assume that they obtained their income solely from the civil service. Since the entry to each subsequent rank was more restrictive, we assume, for convenience, that 10, 20, 30, and 40 percent served in ranks 9, 10, 12, and 14, respectively (in practice, no one worked in ranks 11 as a naval secretary [Moscow Province is landlocked] and 13 as a provincial registrar. While the salaries of the upper ranks were fixed, the salary of rank 14 ranged between 250 and 200 AR. We assume that half of this group earned 250 AR while the other half earned 200 AR annually. In sum, we estimate the total income of the personal nobles at 1,666,902 AR (see online appendix for tabulated incomes).

Table D2. The combined income of personal nobles in 1811

Group	Number of households	Average income per household (AR)	Total income per group (AR)
Known individuals	156	341	124,454
Rank 9 (group income)	598	375	224,250
Rank 10 (group income)	1,195	300	358,500
Rank 12 (group income)	1,793	275	493,075
Rank 14 high (group income)	1,195	250	298,750
Rank 14 low (group income)	1,195	200	239,000
Total	6,131	278	1,738,029

Source: see the text.

[23] See laws no. 20143 and 24188 in: *Polnoe sobranie zakonov Rossiiskoi Imperii* [The Complete Register of Russian laws*]. Kniga shtatov*. Vol. XLIV. Part 2. Department III and IV. 1830 p. 233–236

APPENDIX E: COST OF SUBSISTENCE

Table E1. Cost of a bare-bone basket for one adult in Moscow Province in the 1800s, annual average prices per unit in AR

year	rye	oats	beef	butter	salt	tallow candle	linen cloth	soap	costs of firewood	5% of rent	the costs of barebone basket
Units	chetvert	chetvert	pound	pound	pood	pood	arshin	pood	0.26 of sazhen	AR	AR
1800	4.54	2.84	0.05	0.19	0.40	5.74	0.09	5.10	1.92	0.74	13.63
1801	5.18	2.57	0.04	0.17	0.40	5.46	0.09	5.00	1.73	0.73	12.37
1802	4.20	2.52	0.04	0.13	0.41	6.05	0.09	4.62	1.53	0.64	11.58
1803	5.95	3.83	0.04	0.16	0.40	6.64	0.09	4.62	0.31	0.76	13.70
1804											
1805	3.50	3.46	0.04	0.13	0.40	6.20	0.10	6.40	2.48	0.72	15.00
1806	4.75	4.3	0.02	0.26	0.40	3.1	0.14	3.20	0.95	0.77	15.70
Average											13.66

Sources: Moscow vedomosti, 1800, 1801, 1805, RGADA, f. 1204, op. 1, 19324, 19338, 19341, 19342, 19343, RGADA, f. 1290, op. 3 d. 42, 50, 51, 63, RGADA. F. 1205. op. 1. d. 79., Zamechania k tablitsam, pokazuvauthim tseny nyzheishie k pripasam v Mosckve 1782 – 1844, TsGA Moskvy, f. 421, op. 1, d. 5312

Notes: We use the consumption needs from Allen et al. 2011 to calculate the costs a barebone basket. Specifically, oats (chetvert)*2.11+ beef (pound)*12.2* + butter (pound)*12.2 + salt (pood)*0.43 + tallow candle (pood)*0.16 + linen cloth (arshin)*7.04 + soap (pood)*0.08 + firewood (sazhen)*0.26*

APPENDIX F: RECONSTRUCTION OF NATIONAL INCOME

To compare this income level across time and space, we convert the national income per capita of the inhabitants of the Moscow Province in 1811 represented in assignat rubles (44 AR) to the 1990 purchasing power parity Geary-Khamis international dollars (hereafter 1990$PPP). The Napoleonic Wars of the early 19th century distorted the international capital market and the nominal rates of exchange between European currencies. For this reason, we use the standard implicit conversion ratios method (e.g., Malinowski and Van Zanden 2017). Specifically, we use the purchasing power parities (PPPs) to link the Russian estimate (44 assignat rubles in 1811) with similar estimates for Holland, Poland, and Italy to represent the North-West, East, and South of Europe. This selection is determined by the limited availability of the nominal GDP estimates in the literature. Moreover, due to the Continental Blockade that separated Britain from the mainland European markets, we do not include it in the conversion.

This method also faces limitations due to its reliance on the use of standardized bare-bones consumption basket based on Western European consumption patterns. Specifically, while Western European consumers typically purchased firewood on the market, predominately agricultural Russian households collected it themselves. Moreover, due to the Continental Blockade prices of imported manufactured goods in Russia were exceptionally high. For this reason, for example, the Russian peasantry was using readily available ash instead of scarce soap. Those different consumption patterns indicate that the costs of Russian barebones costs of living incurred by a typical Russian peasant were in fact lower than indicated by the cost of the basket. This by extension lowers the Russian GDP expressed in 1990$PPP. Despite those limitations, to ensure consistency, we stick to the standard method of conversion. We include the only available GDP estimates for another preindustrial Eastern European country, Poland, in the conversion (Malinowski & Van Zanden 2017). Because the Polish results for nominal GDP are only available for the 1560s, we use that estimate. All the other estimates are contemporaneous. Table below shows the calculations. The geometric average of the conversions is 1012 1990$PPP. This is almost equal to the conversion via the subsistence ratio, i.e., since the poverty line in 1990$PPP is 300 and the substance ratio based on the bare-bones basket in Moscow Province in 1811 is 3.225, the National Income in Moscow Province in 1811 directly via the ratio is 967 1990$PPP. Our estimate is much higher than Maddison's guestimate of 688 1990$PPP for the territory of the Soviet Union.

Table F1: Estimates of the Moscow Province GDI per capita in 1811

Country (Estimates for 1811)	Ratio GDP pc/subsistence (a)	GDP PC in 1990 $PPP (b)	Moscow Province GDP PC in 1990 $PPP in 1811 (3.225*b/a)
Holland	8.48	2609	991
Region of Cracow (Estimates for the 1560s)	2.93	810	904
Northern Italy	3.95	1402	1143
Geometric average	-	-	1012

Source: Nominal GDP per capita and the costs of substance taken from Van Zanden and Van Leeuwen (2012), Malinowski and Van Zanden (2017), Malanima (2010).

APPENDIX G: CONVERSION FROM NATIONAL TO DOMESTIC INCOME

While national income accounts for the incomes of inhabitants of a territory irrespective of the geographical location of their assets, domestic income accounts only for the sources of income located on the territory. This study focuses on the national income. It accounts for the estates located within and outside of Moscow Province owned by the aristocracy that resided in Moscow Province. In their tax declarations, the aristocrats declared only the total income from all the owned estates (domestic and "foreign"). They also declared the number of estates owned in various provinces (but no income per province or individual estate).

According to our tax data, 421 individual landowners had only a single estate in Moscow Province. Jointly, those estates were inhabited by 28,508 male serfs, who generated 518,066 AR of the reported income. Therefore, the average income per serf was 18.17 AR in Moscow Province. This was above the average income per male serf, which suggests that landowners were able to extract more from serfs closer to where they lived possibly via more intensive supervision.

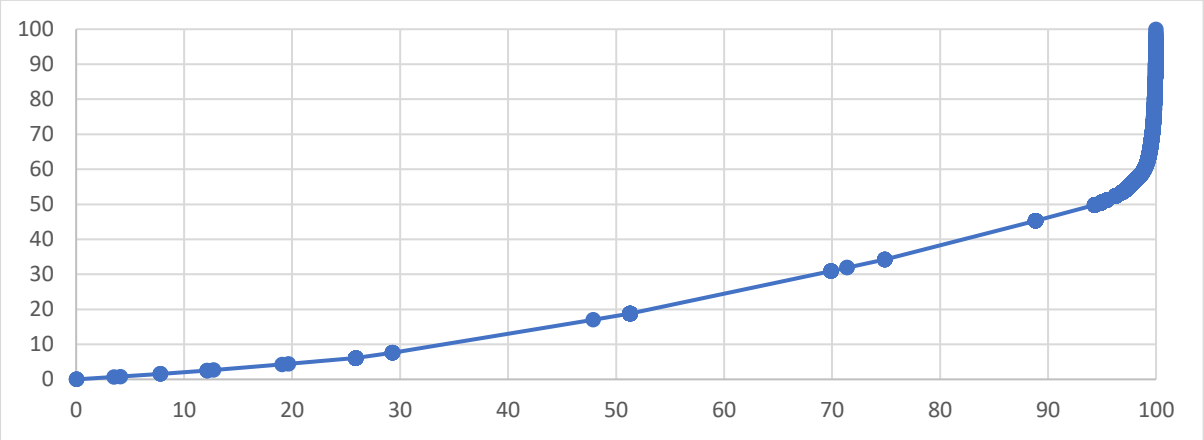
According to the census, there were 275,512 male serfs working on the estates belonging to the aristocracy within Moscow Province. By multiplying the number of serfs (275,512) by the income they generated (18.17 AR), we can conclude that the Moscow Province aristocracy earned 5,006,053 AR in *domestic* income from serfdom.

Moreover, our estimates of the *national* income do not account for the income of the emperor from his private land located in Moscow Province because he resided in Saint Petersburg. By multiplying the known number of male appanage/court serfs working at those estates (22,760 from the census) by 18,17 AR average generated income, we estimate it at around 413,500 AR.

Together, serfdom generated 5,419,553 AR in terms of the *domestic* income and 17,260,887 AR in terms of the *national* income, i.e., 14% and 33% of the respective total. Because we do not account for factories located outside of Moscow Province we do not need to estimate that source of income. We do not expect it to be a major omission since Moscow Province was the industrial/economic center. In total, the national income in Moscow Province in 1811 was 51,861,129. The domestic income was 40,019,795 AR (51,861,129 - 17,260,887 + 5,419,553).

To estimate the distribution of the domestic income we readjusted the incomes of the aristocrats from their estates. 82 aristocratic households held no estates while 421 held only one estate located in Moscow Province. Those households were not affected by the conversion to domestic income. However, the reported income from real estate of the remaining households came from estates located both within and outside of Moscow Province. We do not know the exact income generated by provinces located inside and outside of Moscow Province. However, in total, exactly 1/3 of all the estates of the remaining aristocratic household were located in Moscow Province. To rescale their incomes from national to domestic, we divided the incomes of each such household by 3. We also added the income of the emperor, which is absent in the national income. The domestic income thus constructed amounts to 41 million AR, i.e., very close to the 40 million AR rubles obtained by using other sources. Based on these assumptions, the Gini coefficient of the domestic income distribution was 57.

Figure G1: Lorentz curve of domestic income distribution in Moscow Province in 1811.



APPENDIX H: URBANIZATION LEVELS

Table H1: Urbanization level in European Russia

towns and cities by the populations (female)	number of cities	population (urbanization level in bracket)
less than 5,000	492	1,002,600
from 5,000 to 9,999	91	622,900
more than 10,000	37	1,215,800 (4%)
Total	620	2,841,300 (9%)

Source: Mironov, 1990, p. 24.

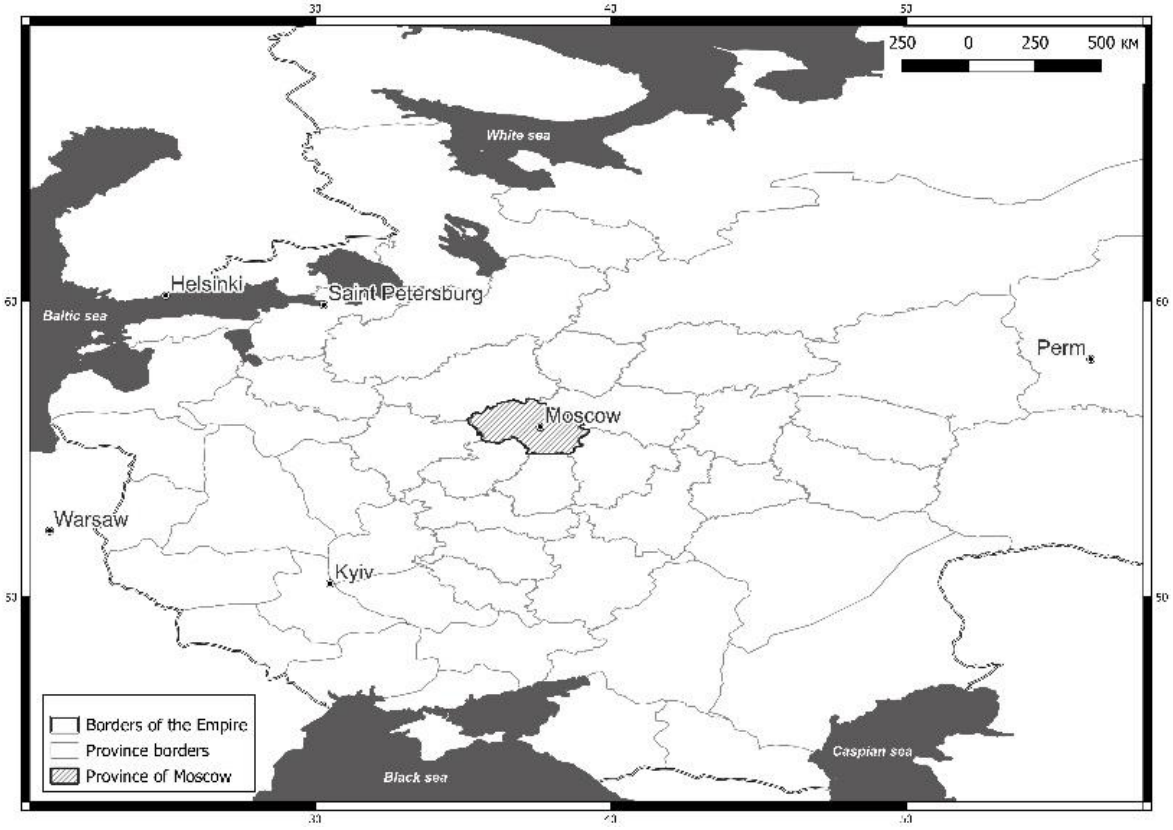
Notes: Table below presents the available information on the population (male and female) of all urban dwellings with the city status in European Russia in the 1800s. This does not include large settlements without the city status. The whole population of European Russia was 30,746,000. The urbanization levels counting cities over 10.000 inhabitants is 4%.

APPENDIX H: MAPS

Map H1. The spatial distribution of estates belonging to the Moscow aristocracy in 1811

Source: Konchakov R., Korchmina E. The Structure of Noble Property of the Moscow Gentry in 1812 //ISTORIYA. 2020. V. 11. Issue 3 (89)

Map 2A: Location of Moscow Province within the European Russian Empire in the 19th century



APPENDIX I: COMPUTATION OF THE POST-TAX INCOME

Czarist Russia was characterized by low levels of taxation. Moreover, taxation was regressive with, in general, poorer individuals paying higher taxes relatively to their income. This is because a fixed poll tax formed the base of taxation. In general, the aristocracy was exempted from taxation apart for a tax on the value of their houses. Regarding the other groups, the following direct taxes were levied:

- Peasant male population in Moscow Province, regardless of age, was subject to 2 AR annual poll tax plus 6 AR obrochnya podat, so altogether 8 AR
- 5 AR poll tax levied on every townsman (all groups but academics, medical personnel)
- 2 AR poll tax levied on male serfs (see estimate in table below)
- 0.16 AR tax on males in rural areas (see estimate in table below)
- 1.25% tax on declared capital for merchants. We assume that the declared capital was equal to the minimum capital required to enter the guild each merchant was a member of (see main tax). This undercounts the tax. We estimate the size of this tax levied at merchants at 62,470 AR.
- 0.5% tax on the value of houses. We have information on the self-reported annual income from a house submitted in tax declarations (see main article), but not on the value of the houses. To confirm income from a house to its value, we assume that the value of a house is equivalent to 20 years of income from the house. Therefore, we assume that the tax is equal to 10% on declared income from houses (income *20 * 0.5%). We estimate the size of this tax levied at all house-owners at 155.393 AR.

As an exception, in 1812 aristocracy paid direct income tax on their income from land in 1811. In total, this amounted to 1,249,173AR. The table below details the taxation rates on aristocratic income:

Table I1: Tax tresholds for the aristocracy for the special property tax

0 – 500 AR	Excluded from taxation
501 – 2000	1%
2001–4000	2%
4001–6000	3%
6001–8000	4%
8001–10000	5%
10001–12000	6%
12001–14000	7%
14001–16000	8%
16001–18000	9%
18001 and up	10%

We expand from 21 to 27 average income groups to differentiate between peasants and serfs due to their different tax statuses but similar incomes. We assume that the distribution of incomes between the two groups was similar. Table below details all the incomes and tax burdens:

Table I2: Pre- and post-tax incomes of various groups with reconstructed average incomes

Estate	Category with the same income	Pre-tax income per household average	Total no. of households	Assumed number of males of any age	Poll tax per male of any age	Tax per household to the Moscow budget in rural areas, 0.16 AR per male of any age (zemskie povinnosti)	Assumed sales	Taxes to Moscow budget. 0.25% of sales	Tax per household	Tax share of income	Total tax paid AR
Personal noble	Rank 9	375	598	2	0	0	0	0	0	0%	0
Personal noble	Rank 10	300	1195	2	0	0	0	0	0	0%	0
Personal noble	Rank 12	275	1793	2	0	0	0	0	0	0%	0
Personal noble	Rank 14 high income	250	1195	2	0	0	0	0	0	0%	0
Personal noble	Rank 14 low income	200	1195	2	0	0	0	0	0	0%	0
Peasant	Poor I	91.42	9562	3	8	0.48	0	0	27.84	30%	266200
Peasant	Medium I	117.48	9562	3	8	0.48	0	0	27.84	24%	266200
Peasant	Medium II	142.84	7171	4	8	0.64	0	0	37.12	26%	266200
Peasant	Rich 1	149.2	2806	4	8	0.64	0	0	37.12	25%	104167
Serf	Poor I	91.42	28685	3	2	0.48	0	0	6.96	8%	199650
Serf	Medium I	117.48	28685	3	2	0.48	0	0	6.96	6%	199650
Serf	Medium II	142.84	21514	4	2	0.64	0	0	9.28	6%	199650
Serf	Rich 1	149.2	8419	4	2	0.64	0	0	9.28	6%	78125
Non-agro serf	Household serfs group	46	14718	2	2	0	0	0	4	9%	58872
Non-agro serf	Serfs worked in manufactures belonging to the nobility	36	8058	2	2	0	0	0	4	11%	32232
Townsfolk	Townsfolk outside of Moscow	36	8572	2	5	0	0	0	10	28%	85720
Townsfolk	Top 33.3%	48	1344	2	5	0	0	0	10	21%	13440
Townsfolk	Middle 33.3%	45	1344	2	5	0	0	0	10	22%	13440
Townsfolk	Bottom 33.3%	36	1344	2	5	0	0	0	10	28%	13440
Townsfolk	Top 50%	79	7855	2	5	0	0	0	10	13%	78550
Townsfolk	Bottom 50%	94	7855	2	5	0	0	0	10	11%	78550
Townsfolk	G) Permanent craft guild members	120	3508	2	5	0	0	0	10	8%	35080
Townsfolk	H) Academics	120	8089	2	0	0	0	0	0	0%	0
Townsfolk	J) Medical personnel	120	8089	2	0	0	0	0	0	0%	0
Clergy	Clergy Town	40	10029	1	0	0	0	0	0	0%	0
Clergy	Clergy Moscow	120	3440	1	0	0	0	0	0	0%	0
Soldiers	Soldiers group	48.5	14389	1	5	0	0	0	5	10%	71945
TOTAL			221,014								2,061,112

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