

*Measurable Power—Railroads, Literacy, and the Crafts Artel’:
Hierarchy in Disarray in Late Imperial Russia*

Abstract

This paper proposes a way to measure the heretofore unexplained techno-cultural “*translation*”¹ of the traditional rural non-agricultural production organization—the mutually insuring skilled workers’ cooperative, the *artel’*—into the historically continuous core of industrial trade unions, the institutional harbingers of modernization in pre-1905-revolution Russia. The ratio of spatially mobile literate wage laborers to population, and to working men, is an explanatory variable for the transition to individualism and rationalism. Peasants’ choice of individualistic landholding, in turn, is positively correlated to the share of children learning to read in the population—which I introduce as a proxy for the human capital aspects modernizing development. By generating non-agricultural peasant income while incentivizing contractual literacy and lowering the costs of collective action, the *arteli* paved the way toward the constitution. To anchor these proposals in data, I use *zemstvo* (rural self-government) statistics for the Penza region, pertaining to the population of literate wage laborers (*gramotnye otkhodnikii*), the distance of village communes (*obshchinas*) from railroad stations, and data on the ratio of households that engaged in craft production to households at large. Following Mironov (2000, 1999, 2012) and Gregory (1994, 1982) and countering Gerschenkron (1962, 1968), I argue that *the cultural revolutions that occurred* (Kahan, 1989) were non-violent and were catalyzed by the Tsarist railroads—setting the peasant population in motion, incentivizing the exodus from analphabetism, enhancing skill accumulation, and predating 1905.

*1. Introduction—The Evolution of Conventions that Forced the Autocracy into the
Concessions of 1905*

The peculiarity of most industrial wage laborers in Late Tsarist Russia was the persistence of their ties to the redistribution of household land-use rights within the frame of the *obshchina*, the pre-revolution village commune.² These rights, which *inter alia* provided social safety insurance in the event of old age and the failure of non-agricultural urban employment, obliged the wage-earning peasant to repatriate wage income for the upkeep of kin in the village.³ Key among these kin were heads of household (*bolshaks*), in whose hands rested the decision to allow wage-earning peasant sons to obtain an internal passport.⁴ Moreover, to cope with the possibility of urban industrial conflict, peasant workers organized along the traditional patterns of rural skilled workers, establishing cooperative structures that emerged from skilled workers’ cooperatives, the *arteli*, supported by *artel’nye kassy*⁵—pooled resources for intra-trade-union mutual insurance. Therefore, it is a-historical to speak of the proletarian class identity in nineteenth-century Russia as an element that explains the

¹ Boyer and Orlean, 1993, in Witt, ed. 1993.

² Johnson, 1979.

³ Burds, 1998; Johnson, 1979; Yokoyama, 2008.

⁴ Burds, 1998 and Gerschenkron, 1962.

⁵ Freeze, 1988.

organization of the strike movement and the revolution of 1905.⁶ It is proposed in this paper that the explanation of the history-specific organization of production and, consequently, of the subversion of autocracy in late Imperial Russia, paradoxically lies in the traditional rural mutual-insurance structures (*krugovaya poruka*). These structures, according to the Slavophile conception, evolved organically. Their implementation varied over time, in response to the topography and the divergent degrees of climate-specific crop-yield predictability, which, interacting with the available technology, determined the demand for mutual household insurance. The Westernizers school, headed by Boris Chicherin, emphasizes, however, that during the serfdom era, predominantly in black-earth regions, the mutual responsibility and aid structures had been enforced by landlords for the purpose of surveillance costs reduction in the collection of taxes and dues, as well as those of extracting corvée labor (*barshchina*) obligations. Following the de jure emancipation of the serfs in 1861–1863, *krugovaya poruka* survived natural selection and the adaptation of institutions to become the backbone of the redemption-payment⁷ structure.

It is argued in this paper that the basic constitutive ethos of the *obshchina*, manifested in communal redistribution of assets and the corresponding legal responsibilities, including land and immobiliers, and in the *artel'*—the peasant mutual solidarity craft cooperative—underwent a transformation from authority-compliance to rationalism due to peasant exposure to the multiplicity of choices introduced by the railroads.⁸ The spontaneous recurrence of the *obshchina* and *artel'* structures among convicts and soldiers⁹ indicates the emerging ethos of increasingly voluntary rural cooperation under mutual insurance.

It is proposed in this paper that a labor organization of this kind, emancipated from its constitutive heritage of serfdom, was translated¹⁰ into modern relations of workers vis-à-vis labor foremen as it adapted itself to the needs of urban industrial production.¹¹ This, I posit, prefigured the subversive trade-union activity that took the place in Late Imperial Russia. The implementation by the Russian peasantry of the abstract concept of class may have occurred

⁶ Ascher 1988 p.

⁷ Gerschenkron, 1962, 1968.

⁸ Sheshinsky, 2010; Gintis, 2009.

⁹ Dostojevskij, Bushnell.

¹⁰ Boyer and Orlean in Witt, ed., 1993.

¹¹ Ascher, 1988.

much later, and was also understood by the Russian peasantry as such, through the prism and the historically specific concepts of their rural organization.¹²

This paper suggests that peasants' mutual guarantee of the quality of production and the social-insurance artel' organization evolved in an embodiment of synergy amid spatial mobility (catalyzed by the railroads), acquisition of literacy, and the organization of skilled handicraft manufacturing for export, that reduced transaction costs and the uncertainty of subversive challenges to the autocracy by trade unions. This paradox should be viewed against the background of the patronage that the Tsarist regime extended to the crafts producers as a way of enhancing enlightenment.¹³

The traditional crafts workshop with its contracting networks, enforcement of rights and obligations, and ability to orient itself among multiple occupational, income, and spiritual options among increasingly spatially mobile wandering peasant homestead communities (*zemliachestva*) was contingent on the acquisition of literacy and education. In this manner, the pre-revolution exodus from analphabetism was discontinuously incentivized by spatial mobility and the proliferation of crafts¹⁴.

In this process, the peasants' ability to give, receive, and exchange information, to acquire education, to organize, and to challenge the traditional hierarchies of patriarchal coercion intensified remarkably. Literate peasants, organized in trade unions and demanding democratizing reforms, eventually posed an effective challenge to the legacies of the personalized patronage and coercion that had survived from the era of Russian serfdom. The railroads, by rendering the rural structures in flux¹⁵ while adapting them to the urban industrial milieu, forced workers to acquire new factual knowledge with incompatibly greater celerity. Thus, the construction of the Tsarist "iron horse"¹⁶ set a multidimensional modernization avalanche in motion.¹⁷

This paper suggests an additional aspect—bringing the total to four—of the process of exodus from backwardness that preceded the 1905 revolution: (1) spatial mobility

¹² [redacted]

¹³ Salmond, 1996.

¹⁴ See also Salmond, 1996, and Brooks, 2003.

¹⁵ Boyer and Orlean in Witt, ed., 1993.

¹⁶ Fogel, 1964. p. 4.

¹⁷ Brooks, 2003.

(2) transition to individualism and rationalism¹⁸ (3) literacy¹⁹, and (4) contingent on 3 and vice versa: the transformation and implementation of rural-cohesion mechanisms that mitigated the costs of collective action in the process of translating pre-modern individual-risk-reducing mutual-responsibility organizations into subversive urban trade unions.²⁰

Extrapolating to future historical findings, the actual vehicles of subversion were encapsulated in the literacy incentivizing *artel'* organization and were additionally enhanced by spatial mobility, creating engines of social progress that challenged the autocracy.

The discussion that follows allows us to ask whether Stalinism, including forced collectivization, had been necessary for the modernization of Russia.

The main empirical findings in this paper, presented in Table 1 (Appendix), indicate that crafts production served as an endeavor that mitigated the risk to individual households' subsistence. This allocation of labor is explained to more than 20% R square by the share of children learning to read in relation to literate working men. Thus, from a dynamic perspective, individual household risk was reduced by the future-orientated acquisition of literacy among peasant children. This finding is consistent with that disclosed in my previous draft, "Railroads to Democracy—Individualism, Rationalism and Literacy, Challenge to Autocracy in Late Imperial Russia" (2018). I present a positive correlation among the share of children learning to read in the population and that of individually cultivated consolidated parcels among all land, indicating peasant rationalist and individualist choice of landholding mode. Thus, **the cooperative *artel'* was based on rationalist utility maximization.**

I argued in my dissertation (2017) that the railroads catalyzed the agrarian reform of 1906. Supported by Brooks (2003), I interpreted my findings as indicating that railroad construction and the implementation of landholding reforms reduced the opportunity costs of children employed in tilling of the land while making their labor allocation in literacy acquisition, as perceived by peasant household heads, a skill with a future high return. The variable of the share of children learning to read relative to the population and relative to the proportion of literate working men was chosen as my modernization proxy. My most interesting finding here is that the increase in this share in the black-earth Penza Province in Late Imperial Russia

¹⁸ Sztern, 2017, Chapter 9, co-authored by Professor Michael Keren, The Hebrew University of Jerusalem.

¹⁹ Sztern, 2018, "Railroads to Democracy: Literacy Individualism and Rationalism—Challenge of Autocracy in Late Imperial Russia."

²⁰ Ma, 2006.

is explained by the share of literate working male adults in the population. This allows me to suggest a discontinuous modernization process. Illiterate parents, in such a transformation, become economic dependents on literate and educated offspring.²¹ Below I explain the identity between the literate working-men variable and *otkhod*—wage labor—that the railroads made possible.

2. *Impersonalization of Law— the Villagers Association (Zemliachestva) and the Artel'*

Here I present elements of anecdotal evidence in tentative support of my introductory statements. Freeze²² asserts that the Russian working class in 1860, growing slowly since the Catherinian era amid its disputes, “bore the stamp of” earlier, that is serfdom-contingent, factory relations. The social control and production relations that were typical of serfdom rested firmly on shared responsibility (*krugovaya poruka*) for taxes and dues in the Russian village commune, as well as other obligations²³ that rotated use rights in peasant land commensurate with the number of labor teams that each household could deploy.²⁴ A petition from a deputation of workers in Penza to the provincial governor on March 20, 1861, concerns the pledge of wage-earning peasants (*otkhodniks*) created by the obligation to repatriate their meager wages. These rules established the conditions for working outside the commune and demonstrated the inadequacy of land endowment, clearly indicative of the status of this land-bound labor force.²⁵ The latter circumstance indicates and emphasizes the importance of local cultural-institutional, meteorological, topographic, and geographic rather than class conditions in the formation of labor associations.²⁶ Moreover, the humble address of the “skilled craftsman [from the ranks of craftsmen] of the Zlatoust Mining Plant petitions” was “*the Most August Monarch! The Most Merciful Sovereign*”²⁷—conceptualizing the institution of the Tsar as the protector of the Russian peasant and the peasant-craftsman rather than his despoiler, as Marxian theory would have it. Similarly, a petition in 1863 to the Finance Ministry-owned Onega Salt Works from *pripisnye* workers (serfs assigned to industrial enterprises) indicates that the relationship with serf-owning gentry estates centered

²¹ Yokoyama, 2008.

²² Freeze, 1988, p. 180.

²³ Hoch, 1986.

²⁴ Worobec, 1995.

²⁵ Also Burds, 1998.

²⁶ Milov, 2001; Burbank, 2004.

²⁷ Freeze, 1988, p. 185.

on the workers' locally delineated collective identity rather than adherence to the abstract concept of class.

It is posited in this paper that the organic association and organization of labor was constituted by the *obshchina* with homesteader (*zemliachestva*) ties, along with the sharing of responsibility among skilled workers within the structure of the crafts *artel*'²⁸ as the institutional vehicles of the transformation. These vehicles embodied the incentive for mutually guaranteed and quality-controlled labor-supply harbingers of income and human-capital accumulation. In this autonomous associational mode, the growing ranks of peasant laborers could present the autocracy with an effective demand for democratizing concessions, a demand that emanated from below. In 1903, Lenin himself proposed that class consciousness be taught²⁹; by so saying, he admitted that such a consciousness did not exist among the peasant masses. The communal-village ethos that evolved in order to mitigate individual households' uncertainty, set in the organized village commune (the *obshchina*), was a pre-structured form of peasant cooperation that would translate, within the community of itinerant peasant artisans and agricultural workers, into *arteli*—shared-responsibility wage-labor organizations that traveled spatially in community-based networks (*zemlichestva*).³⁰ The guarantee of peer-controlled labor quality that the *arteli* offered potential employers³¹ allowed capital to accumulate and shifted the authority flowing from the breadwinner's status from sedentary fathers to spatially mobile sons. The latter population posed a credible threat from below to the prevailing hierarchies of coercion that were based on the patriarchal order, creating a nexus of subversion that historically predated the Marxist-Leninist agitation and the formation of the proletariat as a corporate class. The shared-responsibility labor contract entailed literacy acquisition at least by labor foremen, who earned a premium (*bast shoe*) for lowering transaction costs and mitigating the uncertainty of employment for the labor cooperative as a whole.³² Consequently, as stated in the Introduction, a link took shape between literacy (which allowed knowledge acquisition), seasonal work, and migration—facilitating income-earning opportunities in spatially dispersed crafts and trade employment³³—and the leaders' status. The leaders' authority replaced that of the village-

²⁸ Troyat, 1961, p. 99.

²⁹ Harding, 1996.

³⁰ Johnson, 1979

³¹ Ransel, ed., *Semyonova Tian-Shanskaya 1993*, Appendix: "Form of a contract between seasonal employers and the peasants."

³² Ibid. and Troyat, 1961, pp. 98-99.

³³ Johnson, 1979; Anderson, 1980; Brooks, 2003, p. 10.

bound patriarch, whose traditional experience and social standing historically represented the embodiment of the individual villager's risk insurance.

The strikes of 1870–1880 and their successors in the 1890s, through which child labor below age twelve was banned and women's working hours were limited, eventually also capped men's work day at 11.5 hours.³⁴ By abusing their ability to level fines, employers triggered organized protests that were quashed with excessive force. Interestingly, the workers who were involved in these events organized along *obshchina–artel'* lines that entailed mutual aid. The peasantry in conflict addressed itself to its economic pledge and uncertainty by setting up occupationally differentiated mutual-assistance funds—of shoemakers, weavers, paper makers, domestic servants, etc.³⁵—that allowed them to persevere in the face of Tsarist repression.

Workers' demands that were brought before the Tsar on January 9, 1905, created a blueprint for peasant petitions to the Duma in numerous provinces in 1906,³⁶ repeatedly demanding universal suffrage and free and universally accessible education. The 1905 petition clearly emphasizes individual rights—“equality of all before the law”³⁷—and the de jure and de facto abolition of the collectivist hierarchies of coercion. As I argue, however, in a Bakunian and not in a Marxian or a classical Liberal spirit, it stands to reason that peasant rural organization during and after the industrialization spurt of the 1890s presented the autocracy with an effective credible threat from below, encapsulated in the emergence of trade-union subversion that made the individualization of land rights in the 1906 Stolypin reform, ratified by the First Duma the same year, possible. The individualization of rights entails, by tautology, the *impersonalization* of rights and transformation of the distribution of entitlement to them (Sztern, 2017, referring to Pipes, 1999). Causally, the skilled workers' *artel'* and the peasants' railroad-enabled spatial mobility incentivized literacy acquisition, enforcing the contractual trade-union structures that became harbingers of the challenge to the patriarchy, supported by the mainstream Orthodox Church, that gave the autocracy its legitimacy. I emphasize, however, the Kahanian nature of the cultural revolution, driven by peasant spatial mobility, literacy, crafts production, and organization. **All of these were contingent on the Tsarist-built railroad system (see below) and its technology, interacting with the historic organic mutual-insurance entities of the peasantry, the *obshchina* and the *artel'*.**

³⁴ Troyat, 1961, p. 97.

³⁵ Troyat, p. 97.

³⁶ Freeze, 1988, p. 279.

³⁷ Ascher, 1988, p. 89.

Paradoxically, the challenge that these posed to the autocracy followed the diversification and growing strength of individualized control of income and belief systems amid the transition to rational choice among the newly available multiplicity of options³⁸—a composite upheaval that predated a blood-soaked conflict.

3. Theoretical Proposal: The Pre-Revolution Modernization Loop

Figure 1, left-hand side

Railroad technology first came to Imperial Russia in 1837–1843. By 1874, it reached the Penza region, a northern black-earth province that is representative of awakening agricultural Russia in terms of its climatic and topographic conditions and its proximity to the Volga River and the canal system. In this paper, it is suggested that this access to means of transport in defiance of the climatic conditions, including frozen waterways, set two phenomena in motion. In one of them, the risk of impoverishment, death in famines, and epidemics was startlingly mitigated. Thus, it circumscribed the existential uncertainty that had made rural households dependent on a mode of mutual insurance that was encapsulated in collectivist reciprocal-aid structures.³⁹ This evokes two questions: Do the dwindling cognitive and temporal hazards of travel and the shrinking distance to urban markets explain, at least indirectly, the regional dispersion of income share of handicrafts production in the peasant budget, which mitigated economic risk over historical time? If the answer is yes, which specific aspects of this process provide the explanation? Below I test, tentatively, the correlation among the share of households involved in the practice of crafts, literacy, and spatial mobility, while acknowledging non-agricultural income in the peasant budget, peasant wage labor in urban industries, and the importation of modern technological expertise in agriculture, healthcare, and artisan skill to the villages.

The railroads did have a countervailing effect—growing social displacement due to increasing migration and seasonal commuting to novel and theretofore unknown institutional and technological environments. Their net impact, however, manifested in population increase, is clear: less risk of death.

³⁸ Sheshinski, 2010; Gintis, 2009.

³⁹ Ascher, 1988, p. 89.

The peasant communities, I argue, strove to mitigate the risks and hazards associated with urban wage labor and migration by organizing along the lines of homestead (zemliachestva) and craft (artel') networks that emulated the mutual responsibility of the peasant commune. Craft production in spatially mobile arteli allowed peasant subversion to take shape while internalizing and reducing the risks associated with the absorption of novelties.⁴⁰ Peasant artisans' mutual insurance and quality assurance were mobile capital-accumulating incubators of new knowledge, anchored in the ever-present incentive to acquire reading and cognitive skills. The travelling peasants were incentivized to acquire literacy skills, education, and practical knowledge that would give them the social mobility that they needed in order to obtain "clean work" in their novel and uncertainty-laden exploration of urban employment options.⁴¹ The effective urban-industrial pull and the agglomeration and spillover of knowledge occasioned by the peasants' use of railroads,⁴² absorbed in the spatially mobile peasant proletarian associations, legitimize the empirical inquiry that follows about the nature of pre-revolution peasant Russia's transition to modernity—an epitomic case of cultural-institutional discontinuity. The discontinuity that I have in mind in this context is the transition to rationalism and individualism, embedded in the dissolution of the authoritarian compulsory collectivist structures that embodied the legacy of serfdom, toward voluntary cooperation within the artel' setting and an individualism that was, as I argue in my dissertation, codified ex post in the 1906 Stolypin reform.⁴³

The Empirical Model and Its Variables, Figure 1, right-hand side

This paper, the third of my post-doctoral drafts, identifies three explanatory variables that *embody* the railroads' causal effect: the ratio of literate wage-earning, commuting peasants to the total population and to that of working commuting peasants; the share of households that enjoy an income from crafts (hereinafter: craft-producing households) in the population of households; and a prospective developmental variable: the share of literacy-acquiring boys in the total population and in that of their role models, literate commuting working men. The share of children learning to read and that of literate working men in the population separately explain, with above-30-percent-power R^2 and DW close to 2, peasants'

⁴⁰ Kingston-Mann, 1991.

⁴¹ Brooks, 2003; Mironov, 2012.

⁴² Fujita, Krugman, and Venables, 2012.

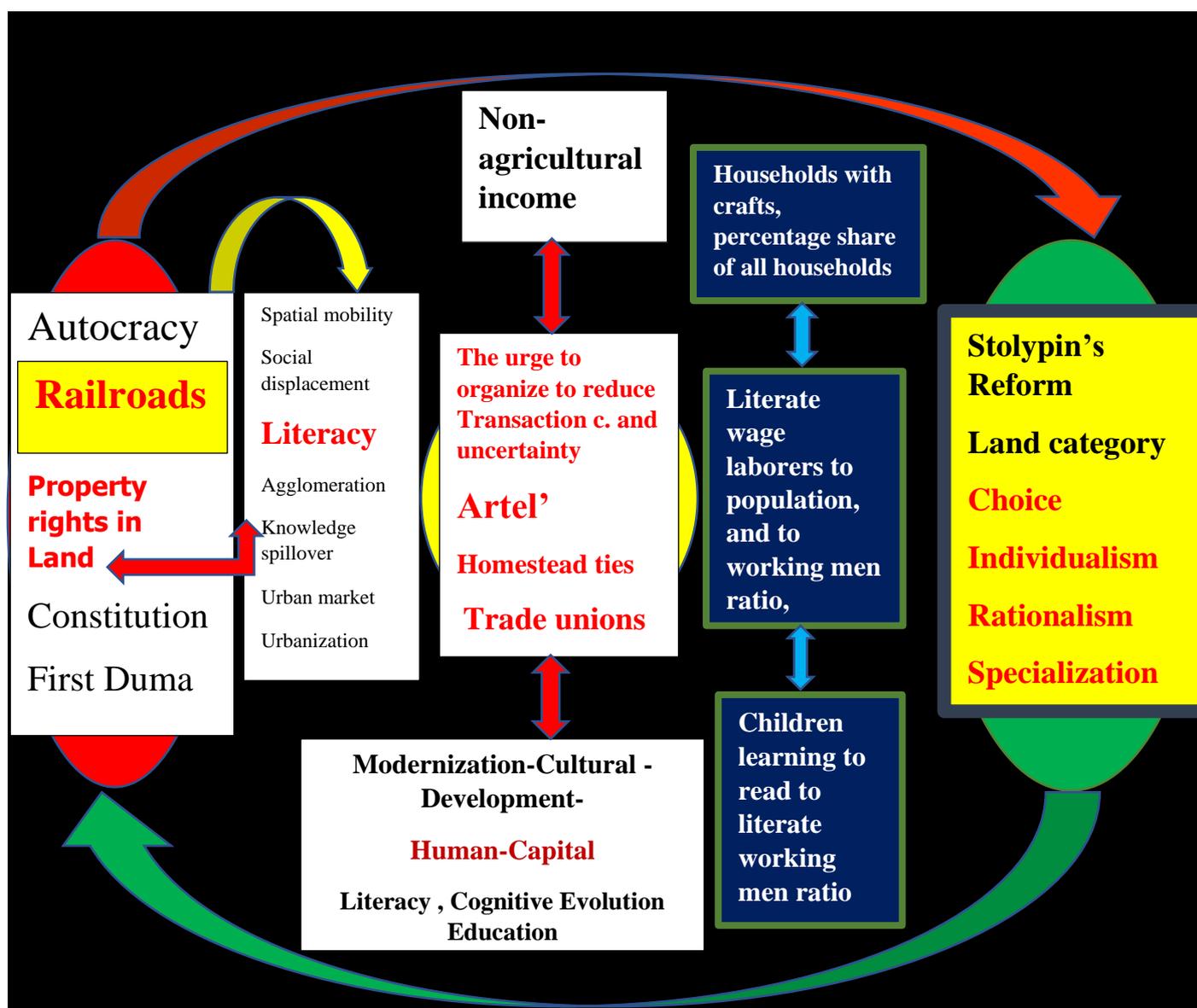
⁴³ Sztern, 2017.

choice of individualist land categories among the fifteen categories that emerged between the emancipation in 1861 and the second stage of the Stolypin reform (1913) in cross-section.⁴⁴ As a new aspect of the cultural revolution that preceded the violent upheaval, I investigate the impact of those among these boys who learned to read vis-à-vis the share of literate working men among that of households that had crafts income. I assume that the frequency of railroad use is embedded in the variables of peasant wage-labor, migration-incentivized peasant literacy,⁴⁵ and, paradoxically (because it occurred farther away from railroad lines), the acquisition of craft production skills, enhanced by the share of children learning to read in the peasant population—a crucial development for the dynamic aspects of modernization in terms of the transition to rationalism and individualism.⁴⁶

⁴⁴ Sztern, 2018.

⁴⁵ Anderson, 1980; Brooks, 2003.

⁴⁶ Ibid.



Sources: Ascher, 1988; Gerschenkron, 1962; Fujita, Krugman, and Venables, 1999; Sztern, 2017, 2018; Anderson, 1980, Mironov, 2012; Johnson, 1979; Eklof, 1986; Markievich and Castaneda, 2017; Martens, 2004.

Part II Empirical Introduction

3. Materials Used—Models and Data

This paper, like my previous post-doctoral drafts and the empirical chapter of my dissertation, is based on statistics from the Penza regional *zemstvo* (rural self-government) for 1913, published under the supervision of V.G. Groman. The novelty in my present use of this source is its use of data on the proportion of *promysly* (peasant households with an income from crafts) among all households. In my model and in the construction of its ratios, the share of

such households is understood as a function of the impact of the railroads on literacy and the share of children learning to read in the population. Thus, the use of the peasant literacy data in the Penza statistics material is matched by a sample of the distances between peasant villages and railroad stations in the region's nine *uezds* (districts) as well as the total peasant population, literate wage-earning men, and wage-earning men. The source did not collect data on working women, least of all literate working women. By implication, women did not engage in wage labor to a sufficient degree and, in turn, did not acquire the spatial mobility that I assume to have motivated the acquisition of literacy. The data also contain the variables that I use as proxies for the dynamic aspect of modernization: *uchiashchichsia malchikov* (boys—the more spatially mobile gender) who learned to read. I chose to focus on literacy-acquiring boys because the gender-contingent division of labor assigned the future wage-earning breadwinner role to boys rather than girls. Thus, the ratio of literacy-acquiring boys to literate working men (their role models) is chosen in this study as an indicator of the modernization -cultural evolution variable.

3.1 Regression equation and the meaning of the ultimate dependent variable— *transformation of the landholding system toward individualization as a proxy for modernization*

In the pre-modern developmental stage, decisions of peasant households and individuals are assumed to be molded and shaped by temporally prior structures anchored in the authority-contingent, risk-diversifying, and risk-mitigating customs of the *obshchina*, the village commune.⁴⁷ Therefore, I select American Evolutionary Institutionalism (AEI) as the appropriate explanatory framework. With the advent of the railroads, which afforded spatial mobility while reducing the mutual dependence of peasant households against natural calamities occasioned by the precarious meteorological conditions of Russian agriculture,⁴⁸ the emerging multiplicity of individual choice options in their spiritual, intellectual, and economic respects legitimize the application of the bottom-up hedonist utility-maximization assumption of which New Institutional Economics (NIE) is structured.⁴⁹ I assume the complementarity of the AEI and NIE frameworks and apply the relative weight theory over time.⁵⁰ The unfolding of multiple institutions before a spatially mobile peasantry allows risk

⁴⁷ McCloskey, 2001; Sztern, 2017.

⁴⁸ Robbins, 1975; Sztern, 2017; Chubarov, 2001.

⁴⁹ Sheshinski, 2010; Gintis, 2009; Sztern, 2017; North, 1973.

⁵⁰ Hodgson, Rizello, and Lawson, 1997; Boyer and Orlean, 1993; Sztern, 2017.

diversification, rendering the pre-modern mechanisms of mutual insurance, derived from “sharing norms,” redundant.⁵¹ This redundancy emancipated the *dvor* (peasant household) from compliance with authority as the means of access to the pool of collective-experience memories that previously mitigated the peasant household’s risk of death under the harsh climatic conditions of Russian agriculture.

The main dependent variable in my sequence of models reflects the adaptation of the institutions to the physical structural conditions of life that shape and mold individual preferences (in AEI—the structure to agency perspective): the **land-to-labor ratio, soil quality, and climatic conditions** that are not prone to short-term changes. The explanatory exogenous variables are relatively flexible anthropogenic ones, such as the technologies applied (in NIE—the agency-to-structure perspective),⁵² that are assumed to change and occasion marginal and cumulatively discontinuous changes that cause and are caused by institutional mutations. By stating this, I recognize interaction between institutions and technology in the manner of drops of water descending on a stone, subjecting relatively constant institutions to irreversible erosion and transformation. Evolutionarily Stable Strategy of survival (ESS) is encapsulated in the rural landholding system. ESS destabilizes and transforms amid peasants’ use of railroad technology. The latter incentivizes, with marginal changes in users’ cognition, their ability to absorb information, engage in non-ritual learning, accumulate personal knowledge not contingent on authority, and amass the capacity for rational choice. All of these determine the mix of agricultural and non-agricultural production technologies that mitigate risk of death.

Thus, the relative dependent variables in my sequence of models are:

- *The share of non-allotment individually held consolidated parcels of land relative to all peasant land.* I assume that this share changed more slowly than did the share of households that engaged in crafts.
- *The share of households engaging in crafts relative to all households.* I assume that this constituted a historical adaptation and risk-dispersion and -mitigation practice, contingent on regionally relatively constant climatic and soil conditions over time, railroad construction, and the consequent distance to railroad stations of structurally earlier origin.

⁵¹ Metzer, 1972; Sztern, 2017, Martens, 2004, McCloskey, 2001.

⁵² North, 2005—the distinction between institutions occasioned by the physical environment and those explained by human interaction.

- The same dependent variable in respect of marginal changes in the share of literacy-acquiring boys relative to the population of literate working men; this variable is less adaptable to short-term relative scarcities.
- *The share of literacy-acquiring boys relative to the population of literate working men.* This presupposes a parental household decision, bounded by ritual tradition, relative to the already-established share of the literate *wage-earning* population (the *otkhodniks*) in the population, which adapts flexibly on the margin.

I with emphasis argue that the *institutionalized association* encapsulated in *krugovaya poruka* (the labor organization based on mutual responsibility) was attenuated by the peasant's use of railroads and structured the transition from authority to rational cooperation frameworks such as the late nineteenth-century *obshchina*, the *artel'*, and the association of homesteaders of shared origin (*zemliachestva*), inspired by the cooperation ethos. These settings, absorbed into the emerging urban trade unions, constituted effective vehicles of challenge to autocracy and the ensuing delegation of land rights to individual heads of household manifested in Stolypin's 1906 reform.⁵³

McCloskey (2001), much in line with my reasoning, points to the economic incentives for risk-sharing and diversification that were manifested in the English open-field and strip-farmed landholdings versus enclosed and consolidated parcels. The risks to soil quality attending to farming under precarious conditions of natural disaster were mitigated by strip farming while average income was low but predictable. The standard deviation of income from the low mean allowed planning and insurance to take place. The consolidated land parcels, in contrast, raised the average income but boosted the standard deviation from the mean to a very high level. The resulting acute volatility and unpredictability of income resulted in severe perceived risk of death by starvation.

McCloskey's analysis encapsulates both sides of the Smithian insights, explaining clustering and cooperation in the terms of rationalistic risk insurance. James C. Scott, in *The Moral Economy of the Peasant* (1976), similarly to McCloskey emphasizes safety-first principle or the minimization of the perceived risk to perish. So does Pallot (1999) in her understanding of the Tsarist Russian village commune structure, as well as Eggertsson (1990) in explaining the structure of the pre-modern village.

I posit that the mutual responsibility (*krugovaya poruka*) that structured the *obshchina*, the *artel'*, and strip farming (*cherezpolositsa*) among the previously tested land categories

⁵³ Sztern, 2017; Gaudin, 2007

should be understood as the implementation of evolutionarily stable “safety first” risk-reducing strategies at the individual household level.

In the investigation that follows, I select the confluence of *crafts, literacy, and spatial mobility, enhanced by peasant use of the railroads* (see Fig. 1 above), and test each of these variables in its relation to the relatively dependent one (which is relatively stable over time). In so doing, I surmise that household craft production uniquely constituted an empowering and, in terms of the negotiating power of the European Russian peasantry, an emancipating institution for the organization of production. Artisanship, particularly in its characteristic of apprenticeship contracts, incentivized the acquisition of literacy⁵⁴. Along with *kustar*’ (cottage industries)⁵⁵, a cooperative organization of skilled workers in an *artel*’ based on written agreements allowed income to accrue, incentivized investment in skills and education, and portended the tacit accumulation of organizational knowledge. Peasant households’ risk of death was thus reduced, paving the way to relative economic and therefore social independence. Under initial conditions of the imperatives of diversifying risk to income and insuring against natural disasters (triggered by crop failures) amid seasonal budget volatility, these *artel*’ properties are of importance. Conversely, the mutual responsibility and contract production by artisans and skilled workers created “*islands of conscious power*” (Coase, 1937) that reduced the costs of collective action and mitigated the risks to the individual of absorbing novel technologies along with progressive ideologies (Kingston-Mann, 1991; Witt, 1993)

In forthcoming research, I will dwell in depth on Tsarist state support of crafts industries as an incentive to the acquisition of literacy, numeracy, and education, i.e., the vehicles of enlightenment and cultural modernization.⁵⁶

⁵⁴ Brooks, 2003.

⁵⁵ Ibid.

⁵⁶ Salmond, 1996.

4. The hypothesis

The selected formal models to be tested are:

- Share of craft-producing households among all households = f (distance from village commune to railroad station);

$$\text{HwCShare1913} = \alpha + \beta \text{DISTOB1913} + u_{1913}$$

choice of individualistic land category relative to all land = f (share of craft-producing households in all households);

$$\text{Indconsofalland1913} = \alpha - \beta \text{HwCShare1913} - u_{1913}$$

- Share of literacy-acquiring children (boys) among literate working men = f (ratio of literacy-acquiring boys to literate working men);

$$\text{HwCShare1913} = \alpha + \beta \text{childshboysoflmr1913} + u_{1913}$$

- Share of literacy-acquiring children (boys) among literate working men = f (ratio of literate working men to population).

$$\text{childshboysoflmr1913} = \alpha + \beta \text{LmrofitogoD1913} + u_{1913}$$

The residual, u , constitutes the aspects of the marginal change in y that are not explained by the selected marginal impact of x on y variable. The slope of the regression; $\Delta Y / \Delta X$, is interpreted as the marginal effect of X on Y . α is the intercept term, interpreted as the value of Y , the dependent variable when X is zero. It is important to note that u as well as α captures the effects of variables omitted from the model. The u term also includes the effect of non-linearities, errors in measuring the X and Y variables, and unpredictable random effects.

The basic assumptions of the model that yields valid regression results are **homoscedasticity** (the residuals cancel out each other—equal scatter) and **serial independence—no autocorrelation**. That is, the residuals are correlated neither with themselves nor with any of the variables. Another crucial assumption concerns the **normality of errors; Y given X is distributed as $N(\alpha + \beta X, s^2\text{-variance})$** .

Advised by Professor Michael Keren, I solve the autocorrelation problem by applying the GLS General Least Squares regression equation. If the residuals are autocorrelated and/or their variance is unstable, i.e., if heteroscedasticity resulting from the *specification of the model errors* (omitted variables) is detected, the Ordinary Least Squares estimator will be biased and inconsistent. When auto-correlation and/or heteroscedasticity are detected and are the results not of model misspecification but of the data-generating process, the General Least Squares estimation method may be relied on to yield efficient parameter estimates (Vogelvang, 2005, pp. 171, 172). I assume that my autocorrelation is the result of DGP. Therefore, I choose the GLS model to handle the spatial autocorrelation in cross-section and the unstable variances heteroscedasticity to achieve efficient results. Moreover, I generate my models implicitly from the general to the specific and assume that there are theoretical reasons for an AR(1) model, when an additional parameter is included in the equation to reduce residual autocorrelation, rendering the estimators efficient.

As for the regression results, I dwell on four crucial indicators: the validity -of the **p values**, the standard deviation of the parameters, the **Durbin Watson** (DW) value, and the strength (explanatory power) of the **R² correlation coefficient**.

The p values are probabilities that the explanatory variable has no impact on the dependent variable, i.e., that the H₀ hypothesis is valid. The lower the p-value, the safer it is to reject the null hypothesis. If the probabilities of rejecting a true H₀ hypothesis exceed 0.1, 0.05, or 0.01, the H₀ hypothesis should be accepted and the conclusion should be that the selected explanatory variable has no impact on the dependent variable. The lower the standard error of the regression and the standard deviation are from the mean of the parameters, the more precise is the parameter (Ramanathan, 1995, pp. 99–104).

The DW test, in turn, applies to **ordered time or a spatial in a cross-section series**. I provide the latter of these. My sample consists of two initial *volosti* (cantons or townships) in each *uezd* (district), with the uezds numbered 1–9 in descending order. In each volost, there are about fifty observation pairs. In each uezd in this sample, there are 100 observation pairs. This gives me about 900 observation pairs in the initial tested ordered sample. Yanguang Chen (2015, pp. 1, 2) writes: “*The structural problems of a model can be reflected by residuals, that is, a series of errors between observed values from the real world, and predicted values given by the model. A good model will give random series without the autocorrelation [...].*” The DW formula in cross-section is constructed with a one-step space displacement, provided the spatial series are defined in one-dimensional space (ibid.). A DW value close to 2 means that there is no first-order autocorrelation (Ramanathan, p. 455), which

means no misspecification of the model. As none of the X's in my model constitutes a spatial lag of the dependent variable, the DW test is valid (*ibid.*).

Finally the crucial coefficient of determination— R^2 —measures the strength of the correlation or the goodness of fit, i.e., the extent to which the regression equation line explains the strength of the actual correlation of the change in the independent variable, x , explaining the change in the dependent variable, y .

3.2 Identification of crucial variables for the analysis

The crucial aspect of analysis is the ability to identify the working-male category, the *mushchin robochich*, with the phenomenon of the *otkhodnik*—the-seasonal wage worker and the migrant who travelled by rail.⁵⁷ Three factors indicate identity. First, the corresponding category of woman is absent in the *zemstvo* statistics despite the female contribution to the *tyaglo* (the agricultural team), working alongside men as the secondary historical sources advise.⁵⁸ The same sources demonstrate that women rather rarely participated in wage labor outside the village and limited themselves largely to geographically restricted intra-village teams.⁵⁹ Apparently, so few women did wage labor that they were not recorded by the third element, those employed by the *zemstvo* (the rural self-government institution). This statistical peculiarity allows us to surmise that men depicted as “working” were participating in *otkhod*, i.e., seasonal, industrial or agricultural wage labor, hired labor that was used when the village endowment's demand exceeded the supply of working hands, or as skilled workers not organized in *arteli*. The second indicator is specific to the collection of the statistics: the total population of men and women in the village, the column pertaining to men separate from women and another separate column for the category labeled “working men.” This category is not identical to the category of “men,” which captures all men who worked either in the village, as members of agricultural labor teams, or outside the village, commuting and engaging in wage labor. There can be no explanation for the separate column of “working men” unless this category depicts wage labor, *otkhod*. The very concept of *otkhod* includes the expression “work outside the village.” Wage labor was usually performed outside the spatial confines of the village and, with a high and growing probability, entailed rail travel. The third indicator, especially valid for this paper, is literacy. Literacy is directly, although as

⁵⁷ Yannay Spitzer, The Hebrew University of Jerusalem Department of Economics, personal communication.

⁵⁸ Worobec, 1995.

⁵⁹ Johnson, 1979.

an untested hypothesis, correlated with use of the railroads and spatial mobility among the peasants.⁶⁰ Therefore, it is less prevalent among women than among men⁶¹ in both the rural and the urban environments. The category that I choose as the denominator is the ratio of literacy-acquiring children (boys) to the population. The modernization proxy is constructed as the ratio to literate working men. In this manner, I believe, there is solid reason to claim that the category of working men, and especially literate working men, indeed denotes *otkhodniks* who commuted by rail. Moreover, the theory-congruent equation results indicate, as the fourth aspect, that there is an identity among *okhodniks* who commuted by rail, wage labor, and this category in the statistics collected by V.G. Groman for the Penza region in regard to working men and literate working men.

The Variables Table

Russian	English	Ratio	Name	Proxy
Hozjajstv z Promyslami	Households with crafts	Of all households	HwCShare	Risk reduction through non-agricultural production
Rozstojanie od stancji zheleznoj dorogi w obshchynie	Distance in village commune		Distob	Function of railroads: technological progress—incentives for spatial mobility
Vnenadelnyj jedinolichnyj otrub	Non allotment individual consolidated parcel	Of all land	Indconsofallland	Individualism and rationalism—modernization
Uchiashchichsia malchikov	Literacy-acquiring children (boys)	Of Literate working men	Childshboysoflmr	Dynamic aspects of transition to modernity
Gramotnych Mushchin Robochich	Literate working men	Of population	LmrofitogoD	The impact of literacy on spatial mobility, and vice versa—transition to modernity

The results and their most immediate interpretation “flow from” the findings of my previous research.

3.3 Share of craft-producing households among all households

Kustari (household peasant craftsmen) produced “sheepskin coats, woolen goods, bast sandals, agricultural implements, furniture, barrels, wheels, musical instruments, clay toys, icons, and much else needed by the people of rural and urban Russia.⁶² Brooks⁶³ reports that the population of craftsmen included autonomous producers who managed trade with nearby

⁶⁰ Brooks, 203; Burds, 1998.

⁶¹ Kahan, 1989, p. 171, Table 6.2.

⁶² Brooks, 2003, p. 10.

⁶³ *Ibid.*, pp. 10–11.

urban markets on their own, along with others who relied on middlemen who traded their produce to longer distances while supplying them with raw materials. It is obvious that the middleman-reliant craftsmen were harbingers of urban and regional information exchange. That is, even if they themselves did not travel, they depended on the railroads for their brokers' spatial supremacy. The number of craft workers during the nineteenth century, calculated for forty provinces of European Russia, is about 1,800,000.⁶⁴ In my investigation, it is crucial to note the indispensability of literacy for the relatively entrepreneurial and independent performance of crafts because every cottage industry entailed a written contract, giving literate artisans a clear comparative advantage. The more an artisan was able to bargain, the greater was his return on literacy. The source advises that literacy among crafts workers in the late nineteenth century did not exceed 30 percent but was higher among toymakers and icon painters than among others.

The source then reports that some 12,000,000 people who legally belonged to the peasant estate lived outside their native villages in 1897. Some 75 percent of them continued to live in the countryside while engaging in spatially mobile wage labor in urban industries. For them, the acquisition of literacy was a useful price to pay for the ability to bargain and negotiate wages. This made literacy a vehicle of economic and social ascendance for craftsmen and mobile wage-earning peasants. In a previous draft, I quoted Mironov (2012), who discovered the growing incidence of analphabetism amid the decline in the economic status of the landed gentry and the increasing accumulation of literacy skill among the capital-amassing peasantry. Land possession and ownership followed literacy as indicators of rising economic and social and, in turn, political decision-making power. We may thus observe social and economic discontinuity and evolution that challenged the previously stable hierarchies of coercion by which the autocracy anchored its legitimacy in patriarchal authority, in tandem with the peasant investment in literacy and additional human capital acquisition. Such a transformation was not violent and was relatively unattended. Nevertheless, it is crucial for understanding the nature of modernization in pre-revolution late imperial Russia.

To place the developmental novelty absorption of the potential embedded in these institutions in its context, one must understand how production in artisan workers' cooperatives was organized. This paper conceptualizes this traditional production mode, paradoxically, as a harbinger of modernity. Artel' production carries a causal connection

⁶⁴ Ibid., p. 11.

between literacy and handicrafts. It is also important to understand the increase in the individual artisan's probability of employment due to shared responsibility for, and guarantee of, the quality of labor supplied within this traditional Russian organization of artisan production, reaching back to the twelfth century, that allowed migrating workers to integrate easily into the organized services, workshops, and factories of the urban landscape. All artels, writes Henri Troyat,⁶⁵ had registered capital with which they covered the costs of the *vkup* (the gift on admission) and the *novizna* (the gift on being received). These funds guaranteed individual workers against their defection or underperformance within the shared-responsibility network. *Artelshchiki*—members of an artel—were intolerant of any deviation from the agreed-upon and mutually guaranteed labor-quality standards. Their reliability, in turn, made them well-to-do. There was no such thing as a “poor or intemperate artelshchik.”⁶⁶ After agreeing on their own social benefits and on pensions for widows and orphans, they elected a *starosta* (president) and a *pisar* (secretary—an office that had an outspokenly literate contingent).⁶⁷ Thus, crafts production was associated with a democratic voting tradition and literacy-dependent structures. Implemented within a modern factory environment, I believe, these institutions acquired properties of modernizing transformers while introducing members to the option of informed elaboration and insurance against the risks of individual failure. If so, arteli constituted an important mechanism of collective action that was capable of coping with the persistent challenge of the ruling-authority-sanctioned hierarchy.

I now empirically investigate the correlations among individualized landholding in the 1913 phase of the Stolypin reform, the share of households that produced crafts, distance from village commune to railroad station, and the share of literacy-acquiring boys among the population of literate wage laborers, i.e., literate *otkhodniki* who commuted by rail (see section 3.3 above). I also investigate the explanatory variable of my modernization proxy (literacy-acquiring boys among literate working men), i.e., the ratio of literate working men to population.

Table 1. Appendix about here

The sign of the equation between the village commune's distance from the railroad (DISTOB) and the share of craft-producing households (HWCSHARE) among all households

⁶⁵ Troyat, 1961, p. 98.

⁶⁶ *Ibid.*, p. 99.

⁶⁷ *Ibid.*

is positive. This result is somewhat counterintuitive to my expectations. I surmised that the closer a commune is to the nearest railroad station, the more easily accessible the urban market would be, the higher the demand for and returns to craft production would be, and the higher would be the share of *promysly* households, those engaging in crafts, among all households.

The secondary sources explain, however, that households engaged in craft production and cottage industry (*kustar'*) during the winter,⁶⁸ as occurred in non-black-earth provinces as well.⁶⁹ Thus, we are advised that such production constituted a supplement to agricultural income, reducing the risk of pauperization in the event of crop failure due to frost and/or infertile soil conditions. Farther away from railroad stations and with less accessibility to urban markets, the influx of agricultural knowledge and income margins that allowed innovative investment in land to mitigate the riskiness of subsistence farming would therefore be higher. This, in turn, would validate the Gerschenkronian hypothesis of a negative correlation between the risk insurance embedded in land rotation and yield per hectare⁷⁰ as a self-enforcing vicious cycle that originates in the longitudinal application of the “safety-first” principle referred to by McCloskey (quoted above) at a time of population growth. Such a conception, however, disregards the communal risk-reduction strategies that were resorted to, and the compensation awarded to individual households for the investment in land made, when village-member households implemented agricultural innovations.⁷¹ Against this background, craft production was an income-risk reduction and diversification strategy for households. Therefore, the farther from a railroad station a commune was, the greater was the risk of crop failure due to deficient implementation of modern agronomic knowledge. This, in turn, amplified the need for land rotation and mutual insurance and dependency on crafts as a way to smooth the meteorologically seasonal instability of the household’s yearly assured agricultural income. At the same time, the combination of agricultural and handicraft income facilitated the peasantry’s future transition from compulsory to voluntary cooperative coordination of production, investing the result obtained with historical legitimacy. In our earlier investigations,⁷² it was found that the most collectivistic and mutually insuring form of landholding was positively correlated to the distance from the nearest railroad station to a

⁶⁸ Ibid., p. 11.

⁶⁹ Worobec, 1995, p. 31.

⁷⁰ Nafziger, 2007.

⁷¹ Kingston-Mann, 1991, p. 43.

⁷² Sztern, 2017, Chapter 8, co-authored by Keren.

group of village communes called a *selo*. The R^2 of the foregoing equation has only 15 percent explanatory value because the availability of railroad stations, a relatively recent phenomenon in craft production, does not explain the centuries-old tradition by which *promysly* households were dispersed and distributed across the regional and provincial geographical space. The highest explanatory power should be assigned, as a hypothesis, to the impact of climatic conditions and soil quality and also to that of literacy—an income source in itself, defined by the peasantry as crafts⁷³—on the percent distribution of *promysly* households in the province. It is necessary to point out once again that Penza is a northern *chernozem* (black earth) province. As such, as in all fertile black earth regions, its subsistence depended predominantly on agriculture. However, stricken with cold winters relative to the south, it relied on craft production as a not-redundant supplement. Given the relative novelty, in historical terms, of railroad availability—thirty-nine years—the discovered positive power of distance from the railroad station in explaining the share of craft-producing households should not be considered devoid of historical content in respect of the dynamic impact on peasant-household modernization of crafts production in locations relatively far from railroad stations.

Thus, in terms of the results in the table, one additional kilometer of distance from the railroad station to the *obshchina* (the explanatory variable) results in a 0.35 % increase in the share of craft-producing households in the *obshchina*. The DW value is close to 2, implying no autocorrelation and, therefore, efficient regression results due to the AR (1) term that absorbs the autocorrelation produced by the data generating process. The probability of refutation of a true H_0 hypothesis is 0.00; consequently, the distance from railroad to village has a significant albeit limited impact on the share of craft-producing households among all households. The explanatory power of distance from railroad to *obshchina* on the share of craft-producing households is 16% (see Table 1, Appendix).

The dependent variable is the most individualistic land category (INDCONSOFALLLAND—Table 1, Appendix) among the fifteen categories that emerged in the second (1913) stage of the Stolypin reform.⁷⁴ The share of all land that is non-allotment land—individual consolidated parcels (*wneadelnoe zemlevladienie, jedinolichnyj otrub*)—is negatively correlated with the share of craft-producing households among all households (HWCSHare). This result is consistent with that preceding. The reader is reminded again that

⁷³ Brooks, 2003.

⁷⁴ Sztern, 2017, Chapter 9, co-authored by Keren.

Penza is a black-soil province, predominantly sustained by agricultural income. The less agricultural subsistence risk households confront, as explained by households' access to the urban market for agricultural produce and the influx of knowledge in agronomy, the more households' dependency on auxiliary income from crafts declines with distance from the nearest railroad station, and the lower is the share of craft-producing households among all households. Drawing on the perceptive and convincing findings of Markievich and Castaneda (2017), I explain below that this mode of landholding, which emerged in Penza in the second stage of the Stolypin reform (the non-allotment consolidated parcel in individual household cultivation) attained the highest per-hectare gains in land productivity observable in the course of the Stolypin reform implementation. Advised by Markievich's writings, I argue that the expected increase in agricultural returns, in tandem with declining coordination and other transaction costs, rendered cottage industry in the individualist holdings redundant. According to results produced in conjunction with Keren (2017), I find that this type of holding is located close to a railroad station with 44% probability. Adults, including craftsmen who engaged in wage labor, were absorbed either directly into the urban modernizing factory system or into the migrating *artel*, the homesteaders' artisan cooperative. Homesteader communities' ties established coordination among seasonal workers and migrants⁷⁵ in their urge to utilize the urban labor markets that the readily accessible railroads had made available.

Thus, one household with a smaller share of crafts among all households will correlate with a 6.6% probability of peasant choice of the individualistic consolidated parcel of all land. In other words, the lower the risk to agricultural return, the lower the household's dependence on crafts will be and the more likely will be the choice of individualistic, high-productivity landholding. Such holdings were positioned at the closest distance to the nearest railroad station. However, the significance level—the p-value—is close to critical, if rounded, to 0.01. Thus, H0 may still be refuted. The strength of the correlation indicates that 34% of the increase in individualistic landholding among all land is explained by the mitigation of households' agricultural risk manifested in the dwindling share of craft-producing households among all households. A DW value close to 2 indicates no autocorrelation; thus, the results of the regression are efficient.

Please continue to follow the results in Appendix Table 1. Interestingly, 23 percent of the increase in the share of crafts-income households among all households (HWCSHARE) is explained by the ratio of boys among children learning to read in relation to the ratio of

⁷⁵ Johnson 1979; Anderson, 1980; Troyat, 1961.

literate working men (CHILDSHBOYSOFLMR). This equation is the most content-laden in the context of the present draft. Boys are conceptualized as the future potential wage-earning urban factory workers who commute by rail and repatriate their otkhodnik wage income as breadwinners (the numerator of the explanatory variable), while literate working men (the denominator) already constitute the literate wage laborers who commute to the factories.⁷⁶ The lower this ratio and the closer to the railroads a commune is,⁷⁷ as one may surmise, the lower will be the share of craft-producing households. And the higher this ratio, as the number of boys among children who learn to read grows faster than the population of literate working men, the higher will be the share of craft-producing households. In my previous draft (2018), I defined the variable of “ratio of children learning to read to population” as a proxy for modernization because it captures the rising opportunity costs of the employment of children in agricultural field work and the growing incentives to exit analphabetism for the purpose of engaging in crafts. This statement entails the qualification of declining per-capita land endowment due to population increase⁷⁸ and peasants’ rising demand for, and social and economic returns to, literacy skills as a function of their spatial mobility.⁷⁹ Even though—as the secondary sources below demonstrate—the diversion of peasant labor from craft production to urban factory work in the course of the industrialization and modernization process was additionally incentivized by the use of railroads, literacy is the common denominator that incentivizes the proliferation of crafts, migration to factory labor, and factory labor itself.⁸⁰ Even as engagement in crafts makes child literacy advantageous, this traditional proto-industrial mode of production acquires the property of an incubating harbinger of modernization. As the proto-industrial phenomenon of *kustar*’ industry contracts increase in tandem with the upturn in spatial mobility and the availability of middlemen, demand for and returns to child literacy grow. This, in turn, abets an increase in prospective peasant mobility to urban factory labor, explaining the accelerating pace of industrialization. This aspect of the pre-revolution Tsarist modernization poses an additional challenge to the Gerschenkronian hypothesis of a custom originating in landlords’ surveillance of serfs’ labor as a mobility barrier to industrialization. According to Gerschenkron’s analysis, under *krugovaya poruka* (the commune’s shared responsibility), the increasingly scarce resource of

⁷⁶ Anderson, 1980.

⁷⁷ Atack, Bateman, Heines, Margo, 2010.

⁷⁸ Jones, A, 1997.

⁷⁹ Brooks, 2003.

⁸⁰ Anderson, 1980; Brooks, 2003, p. 10.

land was assigned commensurate with the number of labor teams in the household, which, according to the grand scholar, tied adult sons to the land. Craft production enhanced peasants' acquisition of literacy and allowed non-agricultural income to rise in relative terms while reducing households' risk of pauperization. According to the foregoing findings, when situated in the most collectivistic villages in the *volosti* (cantons) and the province, this mode of production incentivized bolshaks (patriarchal heads of households) to allow literacy-acquiring boys, among the children, to engage in handicrafts. Literate boys constituted future commuters to urban industries, where they would absorb modern practical knowledge and accumulate income. This process, paradoxically, challenged and eroded the authority of the bolshak and, in turn, the precipitants of the mobility barrier. Viewed from a dynamic perspective, the intersection of crafts, literacy, and peasant spatial mobility transformed the village-commune structure from compulsory and authoritarian to voluntary, with rationally cooperating or dissolving organizations of production.⁸¹

Table 1: One additional boy who learns to read in relation to literate working men will increase the share of craft-producing households by 75%. The significance level of this equation is likewise close to critical. If rounded to 0.05, it would indicate that H0 may still be refuted. The proportion of literacy-acquiring boys to literate working men impacts the share of craft-producing households among all households. The DW value approaches 2, meaning that the results of the equation may still be accepted as efficient. The explanatory power of literacy-acquiring boys as a share of literate working men is 23%, as argued above, which has a dynamic diachronic rather than synchronic importance.

In my previous draft,⁸² the share of literate working men in the population explains more than 70 percent of the share of literacy-acquiring children in the population. This strong R-square correlation clearly indicates that the role models and the incentive-generating constituency for the future exodus of peasants from analphabetism are wage-earning peasants (*otkhodniks*) who commute to urban industries and not the bolshak generation. Thus, the breadwinner's authority shifts from the tradition-laden hierarchical structures, anchored in the ceremonial knowledge reservoir and experience, toward individualized practical bearers of

⁸¹ Sztern, 2017.

⁸² Ibid.

knowledge⁸³— i.e., from fathers to sons. Yokoyama's (2008) collection of peasant correspondence between wage-earning otkhod sons and kin in the villages testifies that the weight of dependence becomes a burden on the patriarchal heads. From Anderson's analysis (1980), it is evident that a positive correlation exists between out-migration numbers and peasant literacy percentage shares. Anderson's findings provide additional support for the attribution to the railroads of direct and indirect explanatory power in regard to literacy acquisition and modernization. The convergence of spatiality and literacy is the harbinger of the cultural revolution⁸⁴ that came into view before the revolutions of 1905 and 1917.

The foregoing equation results (Table 1) ascribe significant explanatory power (53 percent) to the ratio of literate working men to population (LMROFITOGOD)—the explanatory variable—and the ratio of boys among literacy-acquiring to literate working men (CHILDSHBOYSOFLMR). These results are consistent with the previous findings. Literate working men, whose constituency increases in tandem with the frequency of urban factory labor, incentivize the acquisition of literacy among peasant boys via the repatriation of income, the economic incentives (including risk margins for the parental generation, allowing patriarchal heads of households to consider forgoing children's agricultural labor), and the offering of cultural role models for the constituency of boys—literate commuting adults—to acquire craft skills and engage in urban otkhod in the future. As out-migration is found to be positively correlated with literacy⁸⁵ and the railroads by definition allowed the frequency of out-migration to increase, the railroad technology—I argue—was the lever of cultural revolution in the 1890 industrial spurt that abetted the peasant transition to individualism and rationalism⁸⁶ and the *ex post* codification of individual households' property rights in land in Stolypin's 1906–17 reform. This consolidation, coupled with peasants' exodus from the compulsory collectivistic structures of the obshchina, reduced transaction costs and enhanced land productivity, allowing specialization of production to accelerate.⁸⁷ Extrapolating from these processes, I find it justified to suggest that the 1917 revolution was not the primary lever of modernization and that Stalinism was not necessary for the liberation of the peasant masses from the yoke of backwardness, diminishing returns, and Malthusian catastrophes.

⁸³ Based on Veblen's (1931) definition of ceremonial and relatively practical knowledge acquisition. The latter characterizes the modernization process, which encapsulates the transition to rationalistic accumulation of knowledge independent of tradition.

⁸⁴ Kahan, 1989.

⁸⁵ Anderson, 1980.

⁸⁶ Szttern, 2017, Chapter 9, co-authored by Keren.

⁸⁷ Markievich and Castaneda, 2017.

In this regression (Table 1) one percentage share of literate working men in relation to population increase will explain roughly a 60% increase in the percentage share of literacy-acquiring boys in relation to literate working men. The results are significant on a 5% level and the DW value is close to 2, indicating no model misspecification. The R² of the regression is 53%, quite high in terms of ratios. The share of literate working men in the population explains 53% of the share of literacy-acquiring boys in relation to literate working men. In effect, the ratio of working peasants who commute by rail wage to population explains more than 50% of the parental generation's decision to allow boys to exit analphabetism, learning to read rather than tilling the land, in relation to their role models, literate working men.

Peasant Budgets

Budget studies of household income in 13 provinces of European Russia, 1877–1900

Province	Year	House-holds	Individ-uals	Type of Households	Income (rubles)					
					Agri-culture	Live-stock	Crafts, trade	Other	Total	Crafts and trade % share
Novogorod	1879-80	5	29	Crafts	66	24	165	-	255	65%
Viatka	1880-3	17	157	Crafts	317	60	301	5	683	44%
Perm	1880	18	110	Crafts	58	24	248	-	330	75%
N. Novo-gorod	1877-80	14	101	Crafts	99	-	197	7	303	65%
Saratov	1883	1	5	Agricultural	318	40	-	-	358	-
Voronezh	1885-90	263	2,147	Agriculture	263	115	114	107	599	19%
	1880	1	6	Crafts	43	-	270	-	313	86%
Tula	1881	6	52	Agriculture	151	17	202	-	470	43%
	1879-82	5	44	Crafts	149	22	550	-	721	76%
Vladimir	1880	2	11	Crafts	99	-	118	-	217	54%
Iaroslavl	1879	2	13	Crafts	148	3	245	-	396	62%
Tver	1894	1	5	Agriculture	117	17	29	-	163	18%
	1879-94	4	33	Crafts	150	16	133	-	299	45%
Kaluga	1896	1,313	10,670	Agriculture	240	76	77	5.1	398.1	19%
	1879	2	13	Crafts	102	7	191	-	300	64%
Kherson	1880-1900	126	823	Agriculture	366	15	48	-	429	11%
	1880	1	7	Crafts		-	-	-	-	-
Kuban	1901	7	54	Agriculture	272	130	65	21	588	11%
Avg. per household				Agriculture	253.3	77.5	80.9	20.4	432.2	19%
				Crafts	146.2	25.2	254.6	2.6	428.9	59%
				Total	249.1	75.4	87.7	19.7	431.9	20%
Avg. per capita				Agriculture	31.6	9.7	10.1	2.5	53.9	19%
				Crafts	21.0	3.6	36.5	0.4	61.5	59%
				Total	31.3	9.5	11.0	2.5	54.3	20%

Source: Mironov, 2012, Table 5.27, p. 180. Calculation in the last column: my own.

Climate and Soil Quality—Peasant Budget Structure prior and during the Industrial Spurt of the 1890s

The post-emancipation peasant economy was burdened with dramatic population increase.⁸⁸ It began in the eighteenth century amid landlord effects—the risk insurance that characterized the serf economy,⁸⁹ the enforcement of *krugovaya poruka* (shared responsibility for taxes and dues),⁹⁰ and land redistribution commensurate with the number of labor teams that each household provided. Traditional peasant survival strategies, including *pomoch* (rotation of movable assets by means of *kladka* [bride price] and *bratchiny* [fraternity parties])⁹¹ provided additional leveling that enhanced mutual protection from famine. I argued in my dissertation that the demographic explosion had been caused additionally by the peasants’ growing access to railroad technology in the second half of the nineteenth century and, particularly, in the closing decades of Tsarism. While spatial mobility allowed non-agricultural income to accrue,⁹² gave access to grain storages,⁹³ and triggered an inflow of rationalistic knowledge to the peasant villages,⁹⁴ thereby addressing the plague of epidemics, in the short run the fecundity and fertility patterns remained un-adapted or vested with novel contents that meshed the traditional survival strategies with institutional innovations,⁹⁵ resulting in additional population increase. Worobec’s analysis shows that the peasants met the economic burden created by the combination of post-emancipation redemption payments and declining per-capita land allotments⁹⁶ by with increasing engagement in “domestic industries,” i.e., craft production.⁹⁷ This agricultural-risk-mitigating endeavor was historically typical of the non-black-earth central industrial provinces: Novgorod, Perm, Viatka Vologda, and Nizhnij Novgorod.⁹⁸ In Nizhnij Novgorod, Worobec explains, “*On average, two workers per household contributed non-agricultural income to the peasant budget.*”⁹⁹ According to Mironov’s table (above), about half of the peasant budget in the non-black-earth provinces

⁸⁸ Kahan, 1985, 1989.

⁸⁹ Engelgardt in Frierson, 1993.

⁹⁰ Gerschenkron, 1962.

⁹¹ Hoch, 1986; Gregory, 1994; Sztern, 2017.

⁹² Frierson in Bartlett, 1990.

⁹³ Robbins, 1975.

⁹⁴ Worobec, 2001.

⁹⁵ Jones, 1997.

⁹⁶ Atkinson, 1983.

⁹⁷ Worobec, 1995, p. 31.

⁹⁸ Jones, 1997, p. 63; Anderson, 1980, p. 28.

⁹⁹ Worobec, 1995, p. 31.

was generated by craft production. Penza Province, located between Nizhnij Novogorod to the north, where crafts generated 65 percent of income, and southern-black-earth Saratov, where 100 percent of income was generated by agriculture, is a northern black-earth area where the peasantry maintained income stability by combining agricultural and craft production in proportions that varied over time. As inhabitants of a black-earth province, the peasantry in Penza had endured *barshchina* (corvée labor) obligations during serfdom, a time when tax obligations could also be met by household craft production. Relatively speaking, however, this province was a zone of high soil fertility. Anderson finds a negative correlation between soil fertility and literacy in forty-one provinces of European Russia. Penza Province in 1874–1883 had a low literacy rate among military recruits, at 0–19 percent, as against 50–100 percent in Jaroslavl.¹⁰⁰ This northern chernozem province, Penza, was sustained predominantly by agriculture, the opportunity costs there being prohibitively high. The high literacy rate among Jaroslavl military recruits is positively correlated with the share of income generated by crafts, as may be seen in the table above.

The positive correlation that I found between the share of craft-producing households and that of literacy-acquiring boys among literate working men in 1913 indicates a modernizing and prospective change in the structure of earnings that occurred between 1883, when the literacy census of military recruits was taken, and 1913, when the Penza zemstvo statistics were compiled. The point of departure for the change, I suggest, is 1874, when the railroad first came to Penza. Some 23 percent of the increase in the share of craft-producing households is explained by the proportionate increase in literacy-acquiring boys among literate working men (Table 1). The latter upturn indicates that reading-skill acquisition among boys for the purpose of craft production is a relatively new, prospective, dynamic phenomenon rather than a historical constant. Moreover, there is clear evidence of increasing specialization of production in the province: the closer a village is to the nearest railroad station, the more black-earth agriculture benefits from the dwindling cognitive and temporal distances to the urban market, allowing the individualization of ownership and rising yields per hectare.¹⁰¹ Farther away, in contrast, the promise of future “clean work” in urban crafts, captured by the access-to-railroads function, enhances the acquisition of reading skills and the engagement in contract cottage-industry activity involving children.

¹⁰⁰ Anderson, 1980, p. 37, Map 2.4, percentages of literate military recruits.

¹⁰¹ Markievich and Castaneda, 2017.

Concluding discussion

The peasant spatial mobility that the Tsarist railroads afforded by incentivizing the acquisition of literacy created social-mobility opportunities that were realized in the process of the state led industrialization in tandem with human- and physical-capital accumulation among the peasantry. The resulting synergies abetted the formation of a developmental nexus of growth that meshed the rural and urban economies and unleashed an intense exchange of production technologies, ideologies, and beliefs about the world.¹⁰² These factors posed a necessary but insufficient challenge to the legacies of the authority-contingent hierarchies of coercion. Nevertheless, the results support the validity of the revisionist analyses of Gregory (1994, 1982), Simms (1977), Mironov (2012), and Nafziger (2010) and counter the Gerschenkronian conception of the Tsarist economy as a “dual” one, in which technology imported from the West diverted the allocation of surpluses from peasant Russia, which remained institutionally relatively backward and culturally static, toward urban industry. This industry, from the Gerschenkronian perspective, was steadily aligning itself with Western standards with the assistance of technology imports that were congruent with the “advantages of backwardness,” i.e., the absence of vested interests in obsolete modes of production. Tsarist Russia modernized, and its industrial honesty standards became higher and homogeneous, not solely as the Gerschenkronian school proposes—by emulating the role-model Western entrepreneurial ethos during the second industrialization spurt (1907) that followed the technology import. Crafts and trade-related-credit production in shared-responsibility units, the *arteli* of carpenters and merchants,¹⁰³ were outgrowths of the traditional rural mutual-insurance practices that gave the *obshchina* culture its structure. These outgrowths, including itinerant *arteli* under homesteaders organizations, paved the way—by collectively/cooperatively organizing production and migration in a manner that mitigated individual risk—to the awakening of industrial modern Russia through peer pressure and mutual quality control within settings of shared responsibility. These institutional forerunners of trade unions constituted an effective instrument of subversion. Posing a credible threat from below in the course of the industrialization spurt of the 1890s, rural artisans and wage laborers, transmogrifying into an urban labor force, compelled the Late Imperial government to make modernizing concessions, of which the Stolypin reform in 1906 constituted an

¹⁰² North, 1973.

¹⁰³ Troyat, 1961.

unprecedented delegation of property rights from the Tsarist *votchina* to the peasant *dvor*.¹⁰⁴ Although the modern urban factory seemed to divert labor away from craft production as it absorbed rural labor, making it a substituting endeavor rather than a complementary one, the *artel*' institution, embedded in trade unionism, gave peasant workers ever-strengthening negotiation power and accounts for the success of the pre-revolution urge to industrialize and, in regard to workers' rights, to modernize in late Imperial Russia.

Stolypin's reform, entailing recognition of conquest as the inferior optimum relative to the attainment of popular loyalty and support,¹⁰⁵ prescribed the individualization of property rights in land. The implementation of aspects of this reform that resulted in land consolidation and exit from the commune reduced the costs of cooperation and their contingent uncertainty and transaction costs, allowing land productivity in terms of yield per hectare to increase.¹⁰⁶ This reform must not be misconstrued as a process of revolution from above that involved the importation of land-tenure structures of Bismarck's Germany.¹⁰⁷ Just as *ex post* it codified and encouraged the transition to individualism and rationalism from above, this paper posits that the Tsarist railroads, by discontinuously boosting demand for and returns to literacy, enhanced by means of the latter the production and organization of *artel*'-led Tsarist Russia toward a transition to individualism and rationalism from below. Russia was culturally modernizing before the revolutions that this brief introductory analysis deems as retrograde. This paper called attention to the modernizing synergy that existed among the peasants' spatial mobility, contingent on the railroads, and the crafts *artel*', which diffused its ethos among homesteaders who migrated in search of urban and interregional industrial employment, both factors incentivizing literacy and effectively subversive modern trade-union activity—an activity that combined the seizure of negotiating power and the demand for equality before the law and universal suffrage.¹⁰⁸ The developmental nexus thus proposed emphasizes the core of the technology-driven transition from compulsory collectivism to rational cooperation and individualism—the techno- institutional revolution in Russia's nineteenth-century modernization. As counterfactual as it sounds, physical- and human-capital accumulation amid emerging equality before the law would have allowed peasant

¹⁰⁴ Pipes, 1995.

¹⁰⁵ Sztern, 2017; Ascher, 1988, 2001; Freeze, 1996, Gaudin, 2007.

¹⁰⁶ Markievich and Castaneda, 2017; Poznanski, 1992, 1985.

¹⁰⁷ Pallot, 1999.

¹⁰⁸ Ascher, 1988.

Russia to exit from backwardness without experiencing what Orlando Figes calls “the people’s tragedy.”

Selected references

- Anderson B.A. (1980) *Internal Migration During Modernization in Late Nineteenth-Century Russia*. Princeton New Jersey. Princeton University Press.
- Archer, M. (1995) Realist social theory: The morphogenetic approach. The University of Hertfordshire: Chapter Presented at the 6th International Workshop on Institutional Economics.
- Ascher, A (1988) *The Revolution of 1905. Part I Russia in Disarray*. Stanford, CA: Stanford UP.
- Atack, J. Bateman. F, Haines, M., Margo, R. (2010) Did Railroads Induce or Follow Economic Growth? Urbanization and Population Growth in the American Mid-West 1850-1960. *Social Science History*, June 2010 Vol 34 Issue 2, 171-197
- Atkinson, D. (1983) *The End of The Russia Land Commune 1905-1930*. Stanford, CA: Stanford University Press.
- Backhouse, R. (1985) *A History of Modern Economic Analysis*. Oxford: Blackwell.
- Bakunin, M. (1970) *God and the State*. With a New Introduction and Index of Persons by Paul Avrich. New York: Dover Publications.
- Boserup, E. (1965) *The Conditions of Agricultural Growth: the Economics of Agrarian Change under Population Pressure*. London: Allen Unwin.
- Boyer, R., & Orlean, A. (1993) How Do Conventions Evolve? In Witt U., ed. (1993), *Evolution in markets and institutions* Heidelberg: Physica-Vlg.
- Brooks, J. (2003) *When Russia Learned to Read: Literacy and Popular Literature, 1861-1917*. Evanston, IL: Northwestern UP.
- Burds, J. (1998) *Peasant Dreams and Market Politics: Labor Migration and the Russian Village 1861–1905*. Pittsburgh, PA: University of Pittsburgh Press.
- Chubarov, A. (2001) *The Fragile Empire: A History of Imperial Russia*. London: Continuum.
- Coase, R. (1937) *The Firm, the Market, and the Law*. London: University of Chicago Press.
- Cohen, G. A. (2000) *Karl Marx’s Theory of History: A defense*. Oxford: Clarendon Press.
- Davydov, M. A. (2008) Personal Communication
- Eggertsson, T. (1990) *Economic Behavior and Institutions*. Cambridge: Cambridge University Press.

- Chen, Y. (2016) "Spatial Autocorrelation Approaches to Testing Residuals from Least Squares Regression," January 22, 2016, Department of Geography, College of Urban and Environmental Sciences, Peking University, 100871, Beijing, China.
- Engelhardt, P. N. (1993) *Letters from the Country, 1872-1887*. Translated and Edited by Frierson, C. Oxford: Oxford UP.
- Freeze, G (1988) *From Supplication to Revolution: A Documentary Social History of Imperial Russia*. New York, Oxford: Oxford UP.
- Freeze, G (1996) Subversive piety: religion and political crisis in late Imperial Russia. *The Journal of Modern History*, Vol. 68, No. 2 (June 1996), 308–350.
- Fujita, M., Krugman, P., Venables, A. J. (2012) *The Spatial Economy, Cities, Regions and International Trade*. Cambridge, MA, and London, UK: MIT Press.
- Gaudin, C. (2007) *Ruling Peasants: Village and State in Late Imperial Russia*. DeKalb, IL: Northern Illinois University Press.
- Gerschenkron, A. (1962) *Economic Backwardness in Historical Perspective*. Cambridge, MA, and London, UK: The Belknap Press of Harvard University Press.
- Gerschenkron, A. (1968) *Continuity in History and Other Essays*. Cambridge, MA: The Belknap Press of Harvard University Press.
- Gerschenkron, A. (1970) *Europe in the Russian Mirror*. Cambridge, MA: The Belknap Press of Harvard University Press.
- Gintis, H. (2009) *The Bounds of Reason: Game Theory and the Unification of the Behavioral sciences*. Princeton, NJ: Princeton University Press.
- Gregory, P. R. (1994) *Before Command: An Economic History of Russia from Emancipation to the First Five-Year Plan*. Princeton, NJ: Princeton University Press
- Gregory, P. R. (1982) *Russian National Income 1885-1913*. Cambridge: Cambridge University Press.
- Harding, N. (1996) *Leninism*. Basingstoke: Macmillan.
- Hayek, F.A. (1944) *The Road to Serfdom*. London: Routledge.
- Hoch, S. (1986) *Serfdom and Social Control in Russia: Petrovskoe, a Village in Tambov*. Chicago and London: University of Chicago Press.
- Hodgson, G. M. (2001) *How Economics Forgot History. The Problem of Historical Specificity in Social Science*. London and New York: Routledge.
- Hodgson, G. M. (1997) *Notes on Habits, Institutions and Evolution*. Cambridge: The Judge Institute of Management Studies, University of Cambridge.

- Hodgson, G. M. (2004) *The Evolution of Institutional Economics, Agency, Structure and Darwinism in American Institutionalism*. London: Routledge
- Hodgson, G. M., personal communication (2007).
- Johnson, R. (1979) *Peasant and proletarian: The working class of Moscow in the late nineteenth century*. Great Britain: Leicester University Press.
- Kahan, A. (1985) *The plow, the hammer and the knout—An Economic History of eighteenth century Russia*. Chicago and London: University of Chicago Press.
- Kahan, A. (1989) *Russian Economic History: The Nineteenth Century*. Roger Weiss, ed. Chicago and London: University of Chicago Press.
- Jones, A. (1997) *Late-Imperial Russia, an Interpretation: Three Visions, Two Cultures, One Peasantry*. Bern: Peter Lang.
- Keren, M. (2010), personal communication.
- Kingston-Mann, E. (1991) Peasant communes and economic innovation: A preliminary inquiry in Kingston-Mann, E., Mixter, T., & Burds, J., eds., *Peasant Economy Culture and politics of European Russia*. Princeton: Princeton University Press.
- Kolchin, P. (1987) *Unfree Labour, American Slavery and Russian Serfdom*. Cambridge, MA, and London, UK: The Belknap Press of Harvard University Press.
- Leonard, C. S. (2011) *Agrarian Reform in Russia—The Road from Serfdom*. Cambridge: Cambridge University Press.
- Markievich, A., and Castaneda, D. (2017) The Stolypin reform and agricultural productivity in late Imperial Russia. *Working Paper No 239 CEFIR/ NES Working Paper Series*.
- Macey, D. (1998) A wager on history: The Stolypin agrarian reforms as a process. In Pallot, J. (1998) Christ Church Oxford, *Transforming peasants. Society, State and the Peasantry, 1861–1930*. Selected Papers from the Fifth World Congress of Central and East European Studies, Warsaw, 1995.
- Macey, D. (1990) The peasant commune and the Stolypin reforms: Peasant attitudes, 1906–14. In Bartlett, R., ed. (1990) *Land Commune and Peasant Community in Russia: Communal Forms in Imperial and Early Soviet Society*. London, UK: University of London, Macmillan, in Association with the School of Slavonic and East European Studies.
- McCloskey, D. (2001) English Open Fields as Behavior Toward Risk, in *Measurement and Meaning in Economics*. Chicago: University of Chicago Press.
- Martens, B. (2004) *The Cognitive Mechanics of Economic Development and Institutional Change*. London and New York: Routledge.

- Metzer, J. (1972) *Some Economic Aspects of Railroad Development in Tsarist Russia*. Ph.D. Diss, Department of Economics, the University of Chicago.
- Milov, L. (2001) *Velikorusskii pakhar i osobennosti rossijskogo istoricheskogo protsessa*. Biblioteka Gumer-istoria http://www.gumer.info/bibliotek_Buks/History/milov/01.ph
- Mironov, B. N. (2000) *A Social History of Imperial Russia, 1700-1917*. Vol I., Boulder, CO., and Oxford, UK: Westview Press.
- Mironov, B. N. (2000) *A Social History of Imperial Russia, 1700-1917*. Boulder, CO., and Oxford, UK: Westview Press.
- Mironov, B. N. (1999) *Socialnaya Istoria Rossii Perioda Imperii (XVIII-nachalo XX v) Genezis Lichnosti Demokraticheskoj Semii Grazhdanskogo Obshchestva i Pravovogo Gosudarstva: v Dvuch Tomach*. St. Petersburg: Dimitrij Bulanin.
- Mironov, B. N. (2012) ed. Freeze, L. G. *The Standard of Living and Revolutions in Russia, 1700–1917*. London and New York: Routledge.
- Mokyr, J. (1990) *Lever of Riches: Technological Creativity and Economic Progress*. New York and Oxford: Oxford University Press.
- Nafziger, S. (2010) Peasant Communes and Factor Markets in Late Nineteenth Century Russia. *Explorations in Economic History* (2010), vol. 41 issue 4, pp. 381-402.
- Nafziger, S. & Dennisson, T. (2007) Micro Perspectives on 19th-century Russian Living Standards. Prepared for a meeting with Social Science History.
- Nafziger, S. (2006) Communal institutions, resource allocation, and Russian economic development. Yale University: Dissertation summary
- Nafziger, S. (2007) Land redistributions and the Russian peasant commune in the 19th Century. Williams Town: EHES Lund 2007 and Department of Economics Williams College
- Nafziger, S. (2010) Peasant communes and factor markets in Late Nineteenth Century Russia. *Explorations in Economic History* (2010) vol 47 issue 4: 381-402.
- North, D. C. (1973) *Västerlandets Uppgång*. Stockholm: SNS.
- North, D. C. (1981) *Structure and Change in Economic History*. New York and London: W.W. Norton and Company.
- North, D. C. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- North, D. C. (1993) Economic Performance through Time. Prepared for Presentation as the Prize Lecture in Economic Science in Memory of Alfred Nobel.
- North, D. C. (2005) *Understanding the Process of Economic Change*. Princeton and Oxford: Princeton University Press.

- Pallot, J. (1999) *Land Reform in Russia 1906-1917: Peasant Responses to Stolypin's Project of Rural Transformation*. Oxford: Clarendon Press.
- Pallot, J. (1982) *Social change and peasant landholding in Pre-revolutionary Russia*. Oxford: Research Paper 30 School of Geography University of Oxford.
- Pallot, J. (Summer 1984) Khutora and otruba in Stolypin's program of farm individualization. *Slavic Review*, Vol 43, Nr 2: 242–256.
- Penza Province Zemstvo (1913) Itogi otzenochno-statisticheskogo izsledovania Penzeskoj Gubernii pod obshchim rukovodstvom V.G. Gromana. *Podvornaya perepis krestianskogo khozjajstva obrobotana T.B. shubom*. Penza: Rapoport and Co., 1913.
- Pipes, R. (1995) *Russia under the Old Regime*. London: Penguin Books.
- Poznanski, K. (1985) *The Environment for technological change in centrally planned economies*. Washington D.C. World Bank Staff Working Papers.
- Poznanski, K. (1992) Property rights perspective on evolution of Communist-Type Economies. In Poznanski K 1992 Ed. *Constructing capitalism - The Re-emergence of civil society and liberal economy in Post Communist World*. Boulder, Colorado: Westview Press, Inc.
- Ramanathan, R. (1995) *Introductory Econometrics with Applications*. London, New York: The Dryden Press, Harcourt Brace College Publishers.
- Ransel, D.L., ed. *Village Life in Late Tsarist Russia*. Olga Semyonova Tian-Shanskaya. Bloomington and Indianapolis, IN: Indiana University Press.
- Rizello, S. (1999). *The Economics of the Mind*. Chaltenham, UK: Edward Elgar.
- Robbins, R. G. Jr. (1975) *Famine in Russia 1891-1892: The Imperial Government Responds to a Crisis*. New York, London: Columbia University Press.
- Salmond, W. R. *Arts and Crafts in Late Imperial Russia—Reviving the Kustar Art Industries 1817–1917*. Cambridge: Cambridge University Press.
- Scott, J. (1976) *The Moral Economy of The peasant. Rebellion and Subsistence in Southeast Asia*. New Haven and London: Yale University Press.
- Semenova Tjan-Sanskaja, O. (1863–1906), Ransel, D.L., ed. (1993) *Village Life in Late Tsarist Russia*. Bloomington and Indianapolis: Indiana University Press.
- Shanin, T. (1985) *Russia as a Developing Society*. London: Macmillan.
- Sheshinski, E. (2010) *Limits in Individual Choice*. Jerusalem: Department of Economics and Center for the Study of Rationality, The Hebrew University of Jerusalem.
- Shivelbusch, W. (1986) *The Railway Journey: The Industrialization of Time and Space in the 19th Century*. Berkeley and Los Angeles: University of California Press.

- Smith, A. (1998) *An Inquiry into the Nature and the Causes of the Wealth of Nations*. With the classic introduction by Ludvig von Mises. Washington, DC: Regnery.
- Smith, A. (2000) *The Theory of Moral Sentiments*. New York: Prometheus Books.
- Smurova, O.V. (2003) *Niezemledelcheski odkhod krestian v stolitsu I ego vlejanie na transformacjii kulturnoj tradicji*. Kostroma: Izd-vo Kostromskogo gos. technologich. Universiteta.
- Spitzer, Yannay 2019 Personal Communication
- Sztern, S. (2017) *Russia on the Move: The Railroads and the Exodus from Compulsory Collectivism 1861-1814* and Sztern, S. & Keren, M. *Was Stalin Necessary? The Railroads and the Crumbling of the Obshchina in Tsarist Russia*. Lund and Jerusalem: PhD dissertation yet unpublished. Economic History, Lund University.
- Sztern, S. (2018) Railroads to Democracy: Individualism, Rationalism and Literacy: Challenge to Democracy in Late Imperial Russia. PEDD Political Economy of Dictatorship and Democracy Conference, Muenster University, Germany, March 2018.
- Sztern, S (2018) Individualism and collectivism. Measuring the transition to modernity in Tsarist Russian peasant society. Penza Province EACES conference Warsaw Poland, September 5-6. Sztern, S. (2000) The Railroad and the Mir. Project description. Lund university. Lund: Sweden and (1997) Jerusalem: The Hebrew University of Jerusalem.
- Sztern, S. (2000) The Russian commune-village, the obshchina; its origins, function and character. Lund University. Lund: Sweden. Paper presented at the Economic History Seminar.
- Sztern, S. (2008) Steam engine on rail and landholding system in nineteenth century Russia. Moscow: Lomonosov State University Economic History Seminar (in Russian).
- Troyat, H. (1961) *Daily Life in Russia under the Last Tsar*. Stanford, CA: Stanford University Press.
- Westwood, J. N. (1964) *A History of the Russian railways*. London: George Allen and Unwin.
- Witt, U (1993) *Evolution in Markets and Institutions*. Heidelberg: Physica-Verlag, A Springer Verlag Company.
- Worobec, C. D. (1990) The Post-Emancipation Russian peasant commune in Orel province 1861-90. In Bartlett, R. (1990) ed. *Land Commune and Peasant Community in Russia: Communal Forms in Imperial and Early Soviet Society*. University of London. London: Macmillan in Association with the School of Slavonic and East European Studies.

Worobec, C. D. (1995) *Peasant Russia Family and Community in the Post-Emancipation Period*. DeKalb, IL: Northern Illinois University Press.

Veblen, T. (1931) *The Theory of the Leisure Class*. New York: Modern, 1931.

Vogelvang, B. (2005) *Econometrics—Theory and Applications with Eviews*, Essex, England: FT Prentice Hall Financial Times

Yokoyama, O. (2008) *Russian Peasant Letters Texts and Contexts*. Weisbaden: Harrassowitz Verlag.

Appendix

Results Table

Indconsp%land	HWCSHARE		CHILD SHBOYSO FLMR		CHILD SHB OY SOFLM R	LMROFITO GOD	
	Coeff	P.value		Coeff	P-Value	Coeff	P-Value
C	0.110399	0.000100		0.441076	0.000000	-0.008626	0.000000
HWCSHARE	-0.065748	3.871635 0.014500		0.750064	26.38837 0.051900	0.588942	-8.218671 0.000000
AR(1)	0.558377	-2.449534 0.000000		0.499190	1.947693 0.000000	0.111189	56.71864 0.024200
		25.30538			12.74584		2.259795
R-squared		0.337379			0.232686		0.534857
Adjusted R-Sq		0.335122			0.228668		0.532426
DW stat		0.071830			1.929965		2.077313
Schwarz crit.		-0.641606			-0.145422		-5.633726
SD dep var		0.211173			0.243828		0.020738