

On the Profitability of Russian Serfdom

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The paper examines the thesis, popular among Russian Marxists, that Russian serfdom had become unprofitable for the *serfowners* before the emancipation of the serfs in 1861. Four theoretical models are constructed in order to determine the effects on serfdom of population growth, rise in grain prices, certain restrictions on the serfs' labor obligations, and the replacement of labor services with money payments. Prices of serfs for the several regions and provinces are estimated by regression. With the exception of Lithuania, neither the theoretical nor the empirical results confirm the Marxist hypothesis.

I. INTRODUCTION

WHY did the Russian government emancipate the serfs in 1861? Of the several explanations offered—fear of a serf revolt (Gerschenkron), *raisons d'état* (Blum), cultural factors (Field), military needs (Rieber), the general crisis of serfdom (several Marxist historians)—the hypothesis most enticing to an economist was suggested by the Soviet historian M. N. Pokrovskii: the serfs were freed because serfdom had become unprofitable for the masters.¹ It is enticing because profitability

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¹ Alexander Gerschenkron, "Agrarian Policies and Industrialization: Russia 1861–1917," *The Cambridge Economic History of Europe* (Cambridge, 1965), vol. 6, part 2, pp. 706–800. Jerome Blum, *Lord and Peasant in Russia from the Ninth to the Nineteenth Century* (Princeton, 1961), pp. 612–18 (Blum also lists fear of serf revolt among the causes [pp. 552, 616–17]). Daniel Field, *The End of Serfdom: Nobility and Bureaucracy in Russia, 1855–1861* (Cambridge, Massachusetts, 1976), pp. 96–101. Alfred J. Rieber, *The Politics of Autocracy* (Paris, 1966), pp. 15–58.

The general crisis of serfdom is a well-accepted Marxist doctrine. See, for instance, P. I. Liashchenko, *Istoriia narodnogo khoziaistva SSSR* [History of the peoples' economy of the USSR]

is quantifiable. In contrast to other explanations, this hypothesis can be subjected to a theoretical analysis and, with luck, to an empirical test. This is the purpose of this paper.

Pokrovskii attributed the alleged fall in the profitability of Russian serfdom to the *rise* in grain prices following the repeal of the British Corn Laws. To our surprise, this rather implausible explanation made more sense than one would expect: the effect on serfdom of a rise in grain prices, a more or less accidental event, will be shown to be similar to the effects produced by population growth, a much more important phenomenon. Both of these effects are analyzed in the first of our four models. Being free of specifically Russian conditions, the model may be widely applicable. Our next two models, in contrast, deal with two conditions particular to the Russian case: a limit on the serfs' labor obligations (called here "Paul's Law") and the specific rates of exchange between the serfs' land allotments and their labor obligations (the "Inventories") imposed by the government in several Western provinces. The last model is concerned with the effects on serfdom of the substitution of money payments (the *obrok*) for labor services.

These four models are presented in Section II. A report on our attempt to estimate empirically the magnitudes of serf prices as indicators of the profitability of serfdom, as well as some additional observations, are given in Section III and in the Statistical Appendix.

II. THE THEORY OF SERFDOM

The first three models deal with a single estate which is meant to represent all serf estates in the country. No transactions within the serf sector are recognized. Therefore the owner (or "master" as we shall call him) can obtain additional serfs only from the natural increase in the serf population, although he can free any of his own serfs.² The quantity of land is assumed to be fixed in the short run, but variable in the long run because land can be bought from or sold to the free sector (subject to certain legal restrictions in the Second Model). In addition, we make the following assumptions:

(Moscow, 1956), vol. 1, pp. 467–510; I. D. Koval'chenko, *Russkoe krepostnoe krest'ianstvo v pervoi polovine XIX veka* [Russian serf peasantry in the first half of the nineteenth century] (Moscow, 1967), particularly pp. 378–85; P. Maslov, *Agrarnyi vopros v Rossii* [The agrarian problem in Russia], 4th ed. (St. Petersburg, 1908), vol. 1, pp. 389–91; V. A. Fedorov, *Pomeshchich'i krest'iane tsentral'nogo promyshlennogo raiona Rossii kontsa XVIII—pervoi poloviny XIX veka* [Landowners' peasants of the Central Industrial Region of Russia, end of the eighteenth–first half of the nineteenth centuries] (Moscow, 1974), pp. 256–57; and M. N. Pokrovskii, *Russkaia istoriia s drevneishikh vremen* [Russian history from ancient times] (Moscow, 1934), vol. 4, pp. 40–84. Pokrovskii was not the only one to claim that serfdom had become unprofitable for the masters. This view was shared by the other Marxists cited here and by a number of non-Marxist writers. See Blum, *Lord*, pp. 563–64.

² In actual fact, a master wishing to free his serfs had to comply with a number of complicated government regulations.

(1) The land of the estate is divided between the master and his serfs in a proportion determined by the master. Land and labor of uniform quality are assumed to be the only inputs, and production on each part of the estate is subject to the same unchanging production function with constant returns to scale.³

(2) All of the land of the estate is utilized, so that (in the short run) an increase in the amount of land for one user implies less land for others.

(3) The total number of hours per week worked by each serf subject to labor services (*barschina*) is constant and independent of the division of his time between his own and his master's land. (The *obrok*-paying serf described in the Fourth Model is on his own.)⁴

(4) Each serf is allotted a combination of land and time sufficient to produce a subsistence level of output for his own use. This level will be treated here as a constant.⁵

(5) The net (of seeds and other expenses) output of the estate and the subsistence output of the serfs can be unambiguously stated in real terms, such as units of grain.

(6) The master seeks to maximize *his own income* from the estate, subject to the constraints imposed by Assumption 4, and by certain legal restrictions in the Second and Third Models.⁶

We are particularly interested in the conditions which would induce the representative master to free his serfs. We assume, that if he did so, he would retain all his land (contrary to the actual terms of the 1861 Emancipation) and that he would operate his estate with free labor under competitive conditions. In all of our models we disregard the existence of house servants, estate craftsmen (the *dvorovye liudi*), and serfs working in manufacturing.

Our models present a highly stylized picture of Russian serfdom. For a more realistic description, we refer the reader to Blum's classic work (see footnote 1), which can also serve as background.

³ The assumption that serfs did not work harder on their own land might appear strange. But data collected by Koval'chenko, *Russkoe* [Russian], p. 57, for six provinces between 1842 and 1860 show practically equal harvest/seed ratios on both parts of estates. Perhaps the masters appropriated the more productive or more accessible land. Tolstoi's description of how Nikolai Rostov, a model landowner, supervised his serfs on both parts of his estate does not suggest that the serfs displayed any particular ardor when they worked for themselves (*War and Peace*, translated by Leo Wiener [New York, 1968], vol. 4, pp. 370-74). If the serfs had really worked much harder on their own land, it would have paid their masters to use the *obrok* system more frequently than they did (see the Fourth Model).

Koval'chenko, *Russkoe* [Russian], p. 75, confirms that no technological progress was taking place.

No distinction is made in this paper between arable, meadows, waste, or forest.

⁴ The fact that the serfs worked much harder in summer than they did in winter is disregarded.

⁵ Actually, as Blum describes, there were considerable wealth and income differentials among serfs. See Lord, pp. 469-74.

⁶ The assumption of income maximization by the masters probably implies a greater degree of 'rationality' than actually existed. From all accounts, it is clear that Russian serfowners were much less efficient than were American slaveowners.

LIST OF SYMBOLS USED IN PART II

S	Number of serfs on the estate
T	Total land area of the estate
T_M	Land area of the master's part of the estate (the demesne)
T_S	Land area allotted to <i>each</i> serf for his own use
L	Total labor input on the estate measured in man-hours per week
L_M	Labor input on the master's part of the estate
L_S	Weekly hours allowed to <i>each</i> serf for his own use
H	Total number of hours worked per week by each serf
k	Fraction of weekly hours worked by each serf for himself ($= L_S/H$)
Y	Total income from the estate
Y_M	Master's income from the estate
E	Subsistence level of each serf
R_L, R_T	Marginal product of labor and land, respectively, on the demesne
Z	The price or exchange rate for an hour of serf labor in terms of units of land ($= T_S/[H - L_S]$)
Z^*	The value of Z imposed under the Inventories in the Third Model
α, β	Labor and land exponents of the Cobb-Douglas production function ($\alpha + \beta = 1$)

Several other symbols will be explained when they are introduced. All diagrams and numerical illustrations are based on a Cobb-Douglas production function $Y = L^\alpha T^\beta$ with values $T = 1,000$, $H = 70$, $E = 15.618$, $\alpha = .7$, and $\beta = .3$.

THE FIRST MODEL—THE EFFECTS OF POPULATION GROWTH

In the absence of legal restrictions, the maximization of the master's income in the short run (with a given number of serfs and a given quantity of land) merely requires an optimal division of the resources of the estate between the master and his serfs. Obviously, this objective will be achieved by equalizing the marginal products of land and of labor, respectively, on the two parts of the estate. With constant returns to scale (Assumption 1), this in turn calls for equal labor/land ratios.⁷

The isoquant ADN on Figure 1 indicates the various combinations of time and land allotted to each serf to allow him to produce the subsistence level of output. The right scale shows the number of serfs

⁷ Assuming a given number of serfs on the estate and a constant subsistence level, the maximization of the master's income from the demesne is equivalent to the maximization of total production on the estate. In other words, the estate can be treated like a slave plantation where the slaves work for the master full time and are provided with their subsistence. Although analytically simple, this approach is less satisfactory as a means toward understanding the nature of serfdom and would prevent the use of this model as an introduction to the following ones.

(on a given estate) which induces the master to choose a particular point on the isoquant, such as point D for 100 serfs.

An increase in the serf population on a given piece of land will require the following adjustments:

- (1) A reduction in each serf's land allotment.
- (2) A corresponding increase in each serf's free time sufficient to maintain a subsistence output level, as illustrated by the southeast movement along the isoquant ADN in Figure 1.
- (3) A contraction of the demesne in order to maintain the equality of the land/labor ratio on the two parts of the estate.

The need for the first two adjustments is obvious. That the third is also required can be shown by a simple argument.⁸ We shall return to this adjustment process below.

The reduction in each serf's land allotment is likely to be accepted by the serfs as a natural effect of population growth. The master's willingness to reduce each serf's labor obligations, and even to transfer some of his own land to the serf sector, may appear to them as evidence of his generosity. In fact, he will be more than compensated for these concessions by the increased supply of labor extracted from the larger serf population.

Thus in densely populated areas both the land allotments and labor obligations of the serfs, and the fraction of the estate occupied by the demesne, should be relatively small. The evidence presented in Blum's recent work on the whole confirms this conclusion.⁹ Foreign travelers were usually appalled by the heavy labor obligations of Russian serfs; they may have failed to note their larger land allotments.

A comparison of the magnitudes of these variables between the eighteenth and nineteenth centuries in Russia is very difficult to make because the data for the eighteenth century are sketchy and contradictory.¹⁰ But it is not impossible that the serfs' labor obligations may

⁸ Let the number of serfs on a given estate increase by 1 percent. If all of the land for the new arrival is taken from other serfs, the allotment of each will decline by (approximately) 1 percent and their free time will have to be increased accordingly in order to maintain their subsistence. The labor/land ratio on the serf land will then increase by more than 1 percent, but on the demesne it will increase by less than 1 percent, violating the efficiency condition of equal land/labor ratios on both parts of the estate. To restore this equality, the master will have to contribute some of his own land to the new serf's allotment. I. F. Samarin, a liberal landowner highly respected as an authority on serfdom, states that an increase in the number of households (*tiagla*) on the estate always caused the master to contribute some of his own land to their allotments. He adds that a master who refused to do so and yet expected to receive more labor from his serfs would be condemned by public opinion as a violator of the serfs' rights. See his *Sochineniia* [Collected works] (Moscow, 1878), vol. 3, p. 205.

⁹ Jerome Blum, *The End of the Old Order in Rural Europe* (Princeton, 1978), pp. 50–59. There was much local variation, however.

¹⁰ See Koval'chenko, *Russkoe* [Russian], pp. 263–81; Fedorov, *Pomeshchich'i* [Landowners'], pp. 19–25; and V. I. Semevskii, *Krest'iane v tsarstvovanie imperatritsy Ekateriny II* [Peasants during the reign of the Empress Catherine II] (St. Petersburg, 1903), pp. 1–100. Unrelated division of land, labor, and output between the masters and serfs in the eighteenth century reported by these authors did not induce them to deepen their investigations.

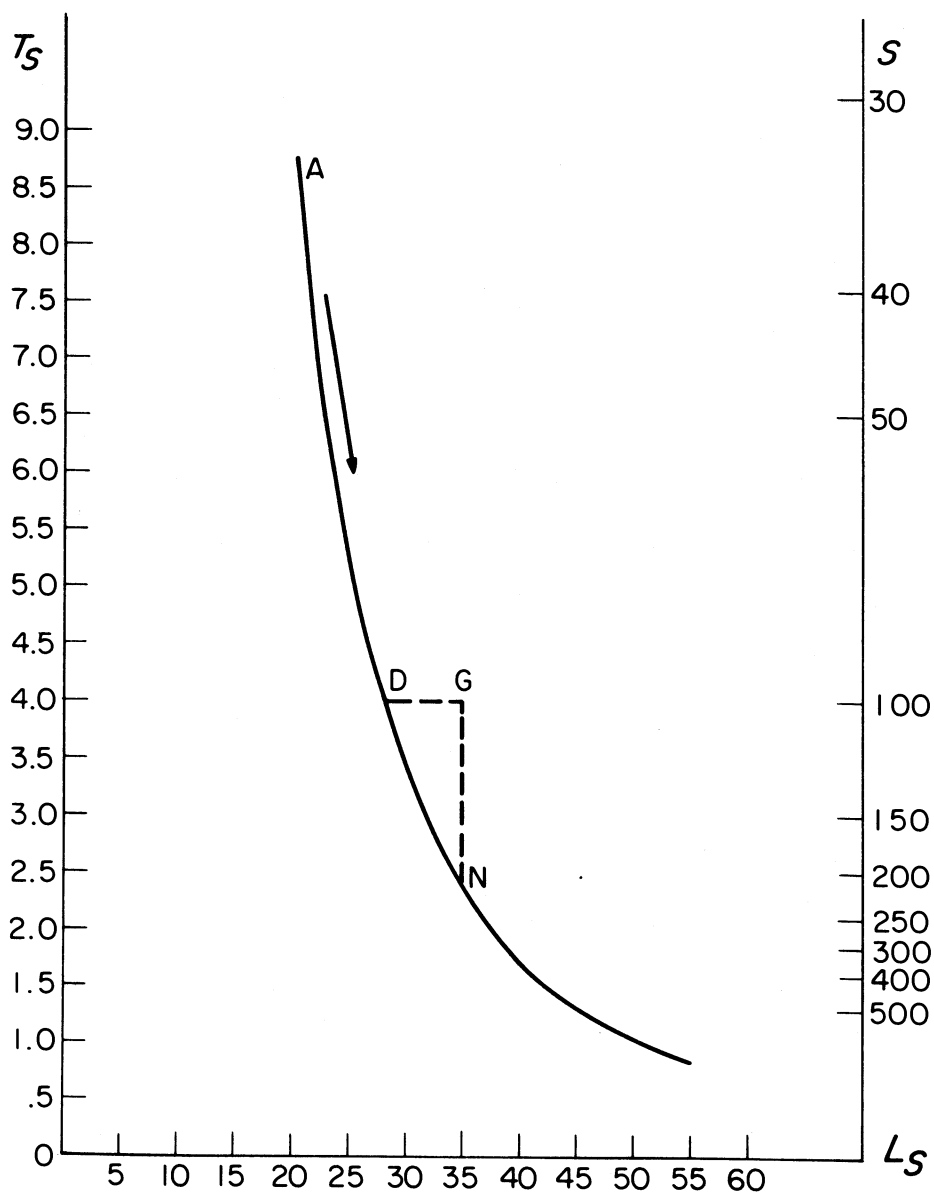


FIGURE 1
THE SUBSISTENCE ISOQUANT

Source: See text.

actually have been lighter in the 1700s (contrary to our model), since Russian serfdom was still developing at that time and did not reach its peak until about 1800.¹¹

According to statistical data collected by the government on the eve

¹¹ However, there is some evidence that in the eighteenth century the labor services demanded from serfs were very heavy indeed. According to Kliuchevskii, General Peter Panin, having

of the Emancipation the size of serf allotments did vary inversely with population density. But in almost all of the areas outside the Western provinces (which were subject to the Inventories) serfs were reported to owe three days of labor per week, the maximum allowed by law (see the Second Model).¹² To report more would have implied disobedience, to report less would have weakened the masters' bargaining position in the coming Emancipation.

The extent of the demesnes of the masters is less easy to ascertain. For some regions there are simply no data; for others all of the waste and forest, which the serfs were allowed to use under certain conditions, were counted among the masters' land; on the *obrok* estates the demesnes were small or nonexistent. In the two regions having the same fraction of *obrok* serfs—the Volga (23.0 percent) and the more populated Central Agricultural (23.7 percent)—demesnes constituted an average of 64 percent of estate land in the former and 52 percent in the latter, a modest confirmation of our reasoning.¹³

In the long run the master had to decide on the maximum number of serfs that should be employed on his estate. Contrary to the beliefs of Russian intellectuals, serf labor was not free to the owner. Like all workers, serfs had to be paid. However, they were usually paid not in money but in land, and on conditions set not by the market but by the master. *This is the essence of (unregulated) serfdom.* More precisely, the cost of maintaining a serf is the income forgone by the master from the serf's land allotment, or $T_S R_T$. An increasing serf population on a given land area increases the rent per unit of land, R_T , but the ability of the master to reduce the size of each serf's plot, T_S , allows him to control the cost.¹⁴ Even then he cannot avoid the rise in the cost of an hour (per week) of serf labor because each serf, allowed more time as a compensation for the reduction of his plot, owes his master fewer hours.

Since each serf works $H - L_S$ hours per week on the master's land, the cost of one hour of his labor to the master is $T_S R_T / [H - L_S]$. The master will desire to own more serfs so long as the benefit derived from an additional hour of serf labor exceeds this cost, that is, as long as

$$R_L > \frac{T_S R_T}{H - L_S}. \quad (1)$$

described the intensive exploitation of serfs to Catherine II, suggested to her that their labor obligations be limited to *four* days a week. See V. Kliuchevskii, *Kurs russkoi istorii* [A course in Russian history] (Moscow, 1937), vol. 5, pp. 128–29, 146–47.

¹² Aleksandr Skrebitskii, *Krest'ianskoe delo v tsarstvovanie Aleksandra II: materialy dlia istorii osvobodzheniia krest'ian* [Peasant affairs during the reign of Alexander II: materials on the history of the emancipation of the peasants] (Bonn, 1865/66), vol. 2, part 2, pp. 1491–551, and vol. 3, pp. 1227–93. Actually, additional payments in kind were often required.

¹³ Ibid.

¹⁴ If the Cobb-Douglas production function is used, then $T_S R_T$, being that part of the serf's income attributed to land, remains constant because in this production function the relative shares of the factors remain constant and the serf's income is assumed to be constant.

The growth of the serf population weakens this inequality from both sides, raising the cost of an hour of serf labor while lowering its marginal product. Eventually, Expression (1) will become an equality and the master will desire no additional serfs. With all serf estates being, by assumption, in the same position, the price of a serf will decline to zero and serfdom will end.¹⁵

This conclusion, however, holds only in the absence of a free sector. If a free sector exists, and if the marginal product of land in it is lower than in the serf sector, the master can counteract the declining marginal productivity of labor on his estate by acquiring more land. If the wage of free labor (of the same productivity) is above the cost of his serfs' labor, he can hire out some of his serfs either directly or via the *obrok* system (see the Fourth Model). If serfs can be trained for nonagricultural occupations (a common occurrence in the central and northern regions of Russia), new uses for their labor will open up. Thus, the final test of the profitability of serf labor need not take place on the serf estate.

There may be special situations, however, when the master is unable to obtain more land (the Russian gentry was notoriously short of cash), or when employment of his serfs in the free sector is not practical. In that case, so long as the implicit cost of serf labor is below the free wage he will refuse to free his serfs even if he needs no additional ones. At most, he may free a serf if a suitable substitute is found, or retain only one son of a deceased father. In this twilight zone, serfdom may persist for a long time, even with a zero price of serfs.¹⁶

A fall in serf prices may also be caused by a rise in the interest rate or by noneconomic factors, such as increasing insubordination by the serfs, caused for instance by rumors of a forthcoming emancipation. We shall disregard all such possibilities, and treat a declining or a very low price of serfs as evidence that serfdom was becoming or had become unprofitable for the masters.

We are now ready to deal with Pokrovskii. Except for one brief reference, he said nothing about serf prices. His empirical evidence was limited to a few quotations from "understanding" serfowners and to several examples supposedly demonstrating the superior profitability of free labor which were collected by a liberal government official in 1840,

¹⁵ Long before that happens, an old serfowner, observing that the productivity of an hour of serf labor had declined while its implicit cost to him had risen as the serf population increased, might forget about the increasing supply of labor available to him and bemoan the falling profitability of serfdom. Similarly, in a well-organized slave market, the master, operating on the margin, will profess his indifference between free and slave labor long before the marginal productivity of slave labor comes down to subsistence. See E. D. Domar, "The Causes of Slavery and Serfdom: A Hypothesis," this JOURNAL, 30 (March 1970), 13-32.

¹⁶ Serfdom may also persist if the master's status is determined by the number of serfs he owns. Many such cases can be found in the Russian pre-Emancipation literature. It is also possible that unfree workers (slave or serf) may be more reliable than free workers.

six years before the repeal of the British Corn Laws.¹⁷ None of this evidence need be taken seriously, but his main point that rising grain prices are inimical to serfdom does deserve an examination.¹⁸

Since a rise in grain prices should benefit all agriculture, free and serf alike, Pokrovskii was obviously concerned only with the relative advantage of using free as opposed to serf labor. A rise in grain prices should make free labor relatively cheaper, at least in the short run, because nominal wages usually lag behind prices. We do not know how long the real wage of agricultural workers in pre-Emancipation Russia might have remained so depressed. With many workers receiving room and board from their employers, their real wage need not have fallen at all. Pokrovskii said nothing about the fall in the real wage and it was not this trivial case that caught our eye.

Several years after the publication of Pokrovskii's book, two economists proved a theorem in the theory of international trade which, when applied to Pokrovskii's assertion, revealed an unsuspected depth in it.¹⁹ Consider an economy consisting of a relatively land-intensive agricultural sector and a relatively labor-intensive craft sector (both exhibiting constant returns to scale), and assume that this economy is currently in equilibrium. A rise in the price of grain (in terms of craft products) will cause an expansion of the agricultural sector and a contraction of the craft sector. The expanding agricultural sector will demand relatively

¹⁷ Pokrovskii, *Russkaia* [Russian], pp. 40–55. The liberal official was A. P. Zablotskii-Desiatovskii, sent by Count P. D. Kiselev to make a firsthand investigation of peasant conditions. This report was included in his major work, *Graf Kiselev i ego vremia* [Count Kiselev and his time] (St. Petersburg, 1882), vol. 4, pp. 271–345.

Actually, the behavior of grain prices, as cited by Pokrovskii, hardly supported his contention. But a more serious recent study made by two Soviet historians does indicate a considerable rise in prices of rye and oats in most provinces during the 1846–1855 (or 1847–1856) period. See Pokrovskii, *Russkaia* [Russian], vol. 4, pp. 44–46, 53; and I. D. Koval'chenko and L. V. Milov, *Vserossiiskii agrarnyi rynek XVIII—nachalo XX veka* [The All-Russian agricultural market, eighteenth—beginning of the twentieth century] (Moscow, 1974), pp. 394–97. But did agricultural prices rise relative to other prices?

¹⁸ We are concerned here with that part of Pokrovskii's argument that is of greatest theoretical interest. We should add that he expected the rise in grain prices not only to make serfdom unprofitable but also to lead to a general reorganization of the serf estates into capitalist enterprises. The serfowners expected to obtain the capital needed for this purpose from the redemption of their serfs by the government on generous terms (pp. 55–84). That such a redemption was in fact carried out after 1861 makes his argument suspect.

Pokrovskii's style is sharp, witty, and partisan. We doubt that his opinion on the profitability of Russian serfdom would have changed had grain prices fallen instead of risen.

Gerschenkron, "Agrarian," p. 726, also spoke about the "sinking profitability of the [serf] estates" without presenting any evidence.

¹⁹ The two economists were Wolfgang F. Stolper and Paul A. Samuelson. See their "Protection and Real Wages," *Review of Economic Studies*, 9 (Nov. 1941), 58–73. For a more recent discussion of this problem, see Ronald W. Jones, "A Three-Factor Model in Theory, Trade, and History," in *Trade, Balance of Payments and Growth: Papers in International Economics in Honor of Charles P. Kindleberger* (Amsterdam, 1971), pp. 3–21; and Samuelson's "Summing up on the Australian Case for Protection," *Quarterly Journal of Economics*, 96 (Feb. 1981), 149–60.

much land and little labor, while the contracting craft sector will release relatively little land and much labor. As a result, there will be an excess demand for land and an excess supply of labor, causing a rise in the ratio of the value of land to the real wage in the free sector. *Since serf labor is paid in land*, the relative cost of serf as compared with free labor will increase. It may rise sufficiently to induce at least some masters to prefer free labor.

If the process just described had taken place, a movement of labor from crafts (and other sectors) into agriculture should have been observed. (The quantity of land used in the nonagricultural sectors was too small to matter.) We have seen no evidence of such a movement and Pokrovskii, innocent of all this theorizing, provides none.²⁰ Even if some labor had moved back into agriculture—a rather improbable event—the effect on the relative prices of labor and land would not have been large because only a small fraction of Russian labor was employed outside agriculture.

But suppose that this effect had been significant. Would it have undermined the relative profitability of serf labor? This would have depended on how free the masters were to manage their serfs. So long as masters were able to select the optimal combination of land and time allotted to their serfs, they could readjust the combination in response to a rise in grain prices (by reducing T_S and increasing L_S), just as they must have readjusted it, from time to time, in response to a growing serf population. With two important exceptions (discussed in the next two models), the Russian government left the serfowners almost completely free to deal with their serfs.

But in countries where the serfs' labor obligations and land allotments were fixed by law or by custom, every increase in land values relative to the cost of free labor, whether caused by population growth, rising grain prices, or any other reason, threatened the profitability of serfdom. Although the original arrangements set by the masters must have priced serf labor, in terms of land, below the existing market rates (otherwise serfdom would have been unnecessary), subsequent developments could have raised the value of land so high that eventually the masters would prefer to be rid of their serfs, provided they could retain the land, while the serfs, for the same reason, would wish to remain in servile condition so long as they could use the land originally allotted to them.²¹

²⁰ Between 1840 and 1856 urban population in European Russia increased by 21.8 percent, or at an annual rate of 1.23 percent. It grew more slowly than in the 1825–1840 period (2.25 percent per year), but faster than in the period 1856–1863 (1.02 percent per year). (The Crimean War was fought from 1854 to 1856). As a fraction of total population, the urban population increased from 9.27 percent in 1838 to 9.98 percent in 1863. See A. G. Rashin, *Naselenie Rossii za 100 let (1811–1913 gg.)* [The population of Russia for 100 years (1811–1913)] (Moscow, 1956), pp. 86, 98.

Urban population, however, is not a good proxy for employment in crafts because many craftsmen resided in villages. See L. V. Tengoborskii, *O proizvoditel'nykh silakh Rossii* [On the productive forces of Russia] (Moscow, 1854), part 2, p. 146.

²¹ The fact that in some European countries the inheritance of a serf's plot was not automatic and had to be secured by the payment of a fee (such as the surrender of the best animal)—a custom

THE SECOND MODEL—THE EFFECTS OF PAUL'S LAW

The limitation of the labor obligation of Russian serfs to three days a week—one of the few important restrictions on the serfowners' powers—originated from a mistaken assertion by Emperor Paul I in 1797. Later it was incorporated as a law in the 1832 code. We shall call it "Paul's Law."²²

The purpose of this law was presumably to protect serfs against excessive exploitation.²³ It should have been obvious even to the Russian government, however, that confronted with this restriction alone the master could easily compensate himself by taking back some of his serfs' land; by demanding additional payments in money or in kind, as many masters did; or by abolishing labor services altogether and placing his serfs on *obrok*, which remained completely unrestricted by law.

Leaving the *obrok* method for the Fourth Model and disregarding the possibility of additional payments, we shall analyze the effect of Paul's Law with the help of Figure 1. Assume that prior to the passage of the law, the master assigned each serf the combination of T_S land and L_S time corresponding to point D, and that the magnitude of L_S was below the new legal minimum (otherwise the Law would be ineffective). The initial effect of Paul's Law would be to move the serfs off the isoquant to point G and make them temporarily better off, having more time and an unchanged allotment of land. A strong or greedy master might move his serfs back to the isoquant (to point N) right away by taking some of their land. A weaker or kinder one could let the growth of population do the job for him. Such a master would endow new serfs with land taken exclusively from other serfs until point N was reached. In the meantime, the size of the demesne would remain constant or might even increase.

In any case, point N is not yet optimal from the master's point of view. It becomes optimal only after a sufficient increase in the serf population (from 100 to 210 in our example). In other words, Paul's Law merely forces the master to give his serfs a combination of time and land not yet called for by the existing land/labor ratio on the estate. When point N becomes optimal (and thereafter) Paul's Law becomes ineffective, and the results obtained in the First Model hold true again.²⁴

completely unheard of in Russia, where every additional working serf was always welcome—suggests that these masters were willing to part with their serfs provided they retained the land.

Early in the nineteenth century, the serfs in the Russian Baltic provinces were given their freedom (more or less) without land. According to V. Kliuchevskii, *Kurs* [A course], vol. 5, pp. 299–300, their position became worse at once.

²² Blum, *Lord*, pp. 445–47. According to Samarin, *Sochineniia* [Collected], vol. 2, p. 421, the law was very poorly worded. It was not clear to whom this limit of three days per week applied.

²³ But, according to Semevskii, Emperor Paul extended serfdom to several new provinces and raised labor obligations in Little Russia from two to three days a week. See his *Krest'ianskii vopros v Rossii v XVIII i pervoi polovine XIX veka* [The peasant question in Russia in the eighteenth and the first half of the nineteenth centuries] (St. Petersburg, 1888), pp. XIV–XV.

²⁴ We have no information on the length of time the masters might have taken to move their serfs from point G to N. In the country as a whole, the serf population grew slowly early in the

TABLE 1
THE EFFECTS OF THE GROWTH OF THE SERF POPULATION ON THE VARIABLES
IN THE SECOND MODEL

Variable	Between G and N	At Non-Optimal N (Paul's Law binding)	At Optimal N (Paul's Law ineffective)
ΔT_S	<0	0	<0
ΔL_S	0	0	>0
ΔT_M^a	0	0	<0
ΔL_M	>0	>0	>0

^a As described in the text, T_M may increase, but not because of the growth of the serf population.
Source: See text.

After the serfs are moved to point N, and before this point becomes optimal for the master, the growth of the serf population presents him with few problems. With L_S set constant by law, he merely has to find the corresponding value of T_S from the isoquant and allocate it to each serf. The process is summarized in Table 1.

On the basis of the table, it is hard to know what to expect. No wonder some Soviet historians have found that the demesnes were increasing and others found that they were contracting.²⁵ During the move from G to N, the serfs lose their temporarily acquired gains. Some contemporary observers and later historians who did not understand the nature of the process interpreted the loss as a permanent decline in the serfs' standard of living.

Our main concern, however, is with the effect of Paul's Law on the masters' attitude toward serfdom. In particular, we wish to find out what happens to the master's income, to the value of his land, and to the price of serfs. We shall assume that the transfer of serfs to point N has been completed, but that this point has not yet become optimal.

The answer to the first question is obvious: by destroying the equality of the land/labor ratios on the two parts of the estate, Paul's Law makes serfdom inefficient and reduces the master's income (and hence, of course, the value of the estate).

The answer to the second question is also simple: now that the master has lost some labor but gained land, the marginal product of land on the demesne will fall. He may try to sell or lease some of his land to the free sector; that such actions were restricted by law suggests that some such

nineteenth century and became almost stationary after about 1830. It is possible that many serf estates remained in a state of transition between G and N until the very end in 1861. See A. Troitskii, *Krepostnoe naselenie v Rossii po 10-i narodnoi perepisi* [The serf population of Russia according to the 10th population census] (St. Petersburg, 1861), pp. 54–56 (English translation by Elaine Herman [Newtonville, Massachusetts, 1982], pp. 68–71); and S. L. Hoch and W. R. Augustine, "The Tax Censuses and the Decline of the Serf Population in Imperial Russia, 1833–1858," *The Slavic Review*, 38 (Sept. 1979), 403–25.

²⁵ See the sources cited in footnote 10. A rise in grain prices, discussed in the First Model, would have little effect on serfdom under Paul's Law. It would merely result in smaller land allotments.

attempts were made.²⁶ He may also try to hire free workers or even his own serfs for pay or try to lease some of his extra land. Finally, the master may solve this and other problems by transferring all or some of his land to the serfs in exchange for an *obrok*, which was not limited by law (see the Fourth Model). Soviet historians give examples of all of these practices, without indicating, however, how widespread they were.²⁷

The effects of Paul's Law on the price of serfs are complex. The marginal product of an *hour* of serf labor on the demesne must increase because of the rise in the land/labor ratio. However, each serf now works fewer hours per week. What happens, then, to the marginal product of serf labor per *week*? The answer will be found in Figure 2.

The solid curve OWQ indicates the master's weekly income as a function of the number of serfs in the absence of Paul's Law. The dotted curve OW shows his income under the law after the transfer of his serfs to point N. Since Paul's Law reduces the master's income, this curve must lie below the solid one until point W, where the law becomes ineffective. On the assumption that both curves and their derivatives are monotonic, this implies that at the beginning the slope of the dotted curve must be smaller than that of the solid one, but later, if the curves are to touch, the dotted curve must become steeper than the solid one. Since these slopes represent the corresponding net marginal products of labor per week, it follows that in sparsely populated areas Paul's Law reduces the marginal product of a serf and hence his price; in more densely settled areas, it raises both; and in very dense areas, where the law becomes ineffective, there will be no change. Since the location of these turning points is empirically uncertain, we cannot make a general statement regarding the overall effect of Paul's Law on the price of serfs or on the duration of serfdom.

All of these assertions are based on the assumption that the restriction on the master's use of serf labor under the law was "reasonable," such as one-half of their total working time. But if the law commanded that the serfs be allowed to work for themselves as much as nine-tenths of

²⁶ The law, enacted in 1814 and 1827, forbade the alienation of estate land below a minimum of 4.5 *desiatinas* per soul (1 *desiatina* = 1.09 hectares) (Blum, *Lord*, p. 532). It is not clear to us whether this minimum applied to the land allotment of each serf or to the land/labor ratio of the whole estate. Skrebetskii, *Krest'ianskoe* [Peasant], vol. 2, part 2, pp. 1491-539, cites many cases when the land allotment for serfs was less than 4.5 *desiatinas* per soul. In any case, the law merely forbade the alienation of land; it did not compel the masters to acquire additional land to restore the minimum. It was not likely to have been important because the restriction only mattered in densely populated areas where Paul's Law must have been ineffective.

²⁷ See, for instance, Fedorov, *Pomeshchich'i* [Landowners'], pp. 42-49; E. I. Indova, *Krepostnoe khoziaistvo v nachale XIX veka po materialam votchinnogo arkhiva Vorontsovykh* [The serf economy at the beginning of the nineteenth century according to the materials in the patrimonial archives of the Vorontsov family] (Moscow, 1955), pp. 178-82; and Koval'chenko, *Russkoe* [Russian], pp. 128-57, 177.

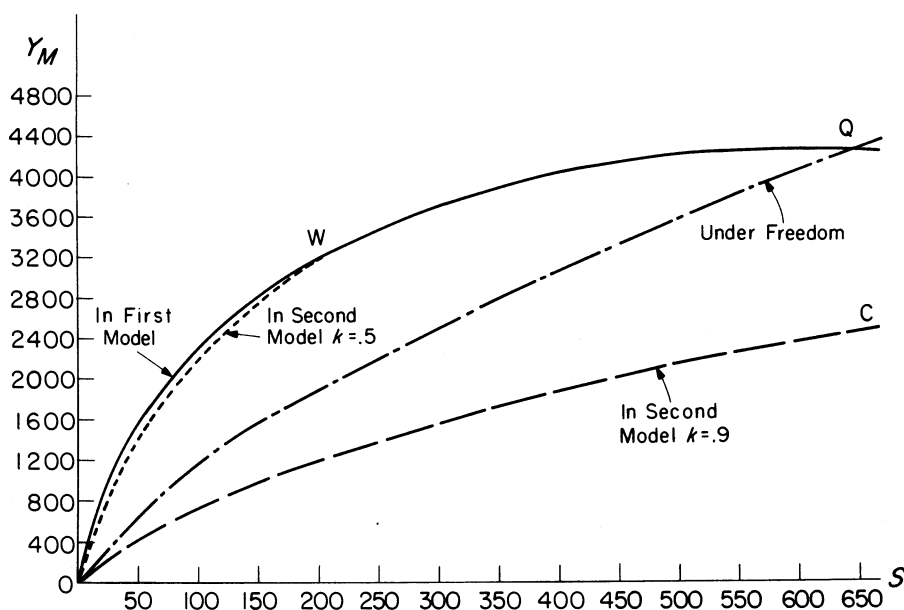


FIGURE 2
THE MASTER'S INCOME UNDER FREEDOM
AND IN FIRST AND SECOND MODELS

Note: The curve OQ—master's income under freedom—is drawn on the assumption that at every point labor is paid the value of its marginal product.

Source: See text.

their time, then the master would earn less (curve OC) than he would under freedom (curve OQ) and he would give up serfdom right away. This was clearly not the intention of Paul's Law.

THE THIRD MODEL—THE EFFECTS OF THE INVENTORIES

The so-called Inventories were (or were to be) introduced into Western provinces in the 1840s to regularize the obligations of the serfs to their masters and thus to gain the support of the serfs (many of them Greek-Orthodox) against their predominantly Catholic masters, whose loyalty to the Russian state was suspect.²⁸ The Inventories did not specify the size of the land allotment to be given to each peasant household and the magnitude of labor services to be performed by it; they merely established the rate of exchange between labor and land in reference to a standard land allotment. With some violation of reality, this rate $Z = T_S/[H - L_S]$ will be treated here as a constant.²⁹ It has

²⁸ According to Blum, *Lord*, pp. 460–62, the Inventories were definitely imposed on the three Southwest provinces (Kiev, Volyniia, and Podoliia) in 1848. But in Lithuania and White Russia they were postponed because of the opposition of the serfowners. However, Skrebitskii, *Krest'ianskoe* [Peasant], vol. 3, pp. 1266–73, describes serfs' obligations in Lithuania as being subject to the Inventories. It seems that the same held true in the Minsk province, but not in the rest of White Russia. He warns that the Lithuanian Inventories need not reflect the actual state of affairs (p. 23).

The Russian government did want to improve the welfare of these serfs, but not to the point of arousing the envy of others who lived elsewhere under Orthodox masters.

²⁹ This is a great simplification. Actually, the serfs' duties were quite complex.

already appeared in Expression (1) in the First Model, but there it was not imposed by the government; it arose implicitly out of the unregulated maximization of the master's income.³⁰ As the price of serf labor in terms of land, this ratio was not constant in that model; it was high when labor was scarce and *it must have declined gradually with the increasing density of the serf population.*

To be effective, the Inventories must set the imposed rate Z^* above the implicit rate Z . Thus the price of labor in terms of land is raised to a level which might have existed in the past when the serf population on the given estate was smaller.

To maximize his income in the long run, the master will wish to own additional serfs so long as the inequality in Expression (1) holds, just as he did in the First Model. That inequality can be written $R_L/R_T > T_S/[H - L_S]$, or as $R_L/R_T > Z$, but since the Z of the First Model is replaced here by Z^* , it should be expressed as

$$\frac{R_L}{R_T} > Z^*. \quad (2)$$

There are two reasons why this inequality will be weakened sooner under the Inventories than it would be without them: first, because Z^* is set above Z ; second, because the ratio R_L/R_T , for reasons explained below, will decline faster. Hence the saturation point will be reached here at a smaller number of serfs (in our example, at 128 as compared with 646 in the First Model). But before this happens, several interesting developments will take place on the estate.

The two constraints now faced by the master—the subsistence isoquant and the new price ratio Z^* —are shown in Figure 3 by the curve ABCN and the ray GN respectively. To satisfy both constraints, without being unduly generous to his serfs, the master will place them on the composite curve ABDN, the exact point chosen being determined by the number of serfs on the estate. Depending on that number, the Inventories will affect the incomes of the master and the serfs in several different ways:

(1) If the number of serfs is very small, above point B (less than 64 in our example—see the right scale), the Inventories are completely ineffective because the Z^* imposed by the government is below the optimal Z chosen by the master. An increase in the number of serfs at this stage will simply induce the master to move them from point A down along the isoquant until point B is reached.

(2) At point B (that is, with 64 serfs) the Inventories become effective. Point B satisfies both constraints.³¹ The serfs will be kept at this point

³⁰ It existed implicitly and was also constant in the Second Model because L_S was determined by Paul's Law and T_S by the subsistence requirement.

³¹ The intersection of $Z^* = T_S/[H - L_S]$ with $E = L_S^\alpha T_S^\beta$ (where E is the subsistence level) results in $L_S = H - (T_S/Z^*)$, where T_S is obtained from the equation $H - (T_S/Z^*) = [E/T_S^\beta]^{1/\alpha}$, which can be solved by trial and error.

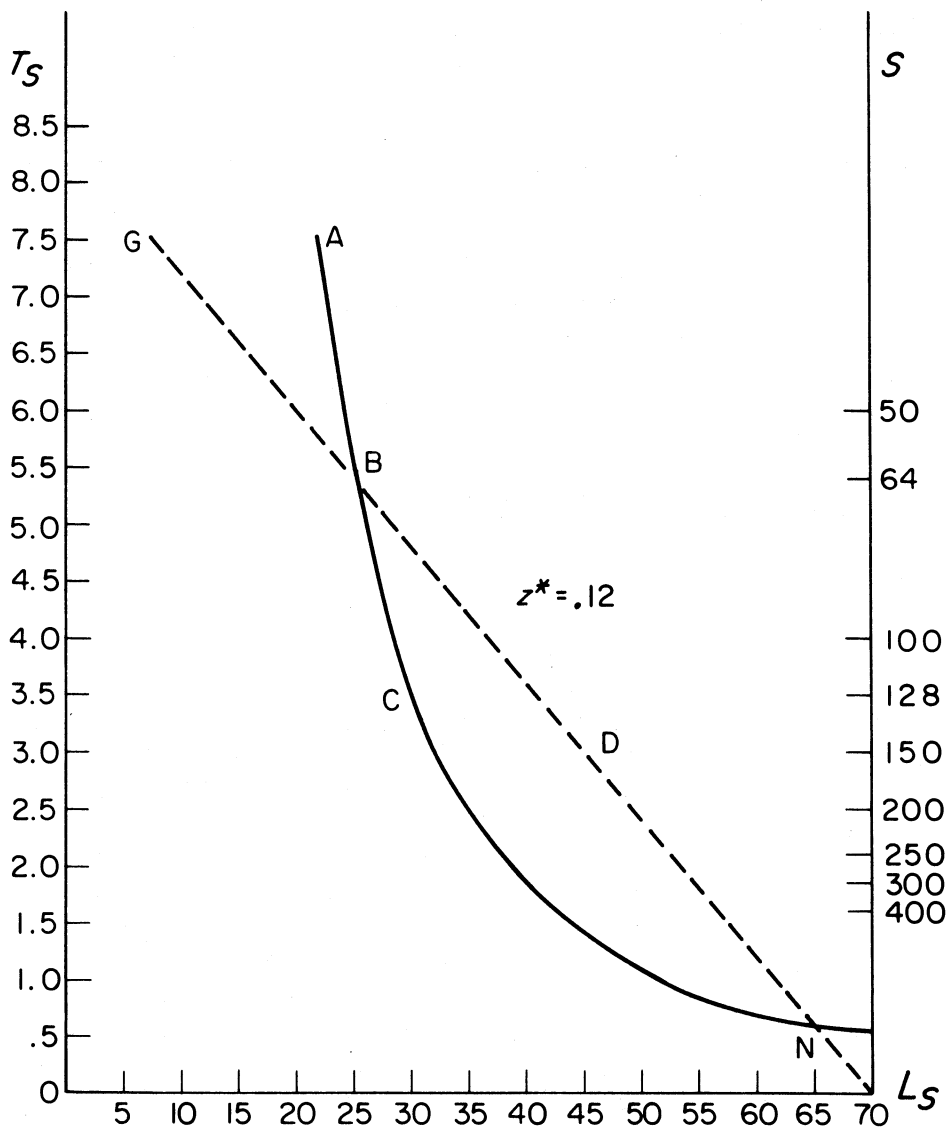


FIGURE 3
THE TWO CONSTRAINTS: THE SUBSISTENCE ISOQUANT AND THE Z^* RAY

Note: Different magnitudes of Z^* produce rays emanating from the same point. Note that the right scale, showing the number of serfs, pertains to the isoquant and not to the Z^* ray.

Source: See text.

even when their number continues to increase so long as the inequality in Expression (2) holds: it will not pay the master to move them down the Z^* ray because the potential gain of moving an additional serf $|\Delta T_S| R_T$ will be smaller than the corresponding loss $\Delta L_S R_L$.³² So long as

³² From the definition of $Z^* = T_S/[H - L_S]$, we obtain $T_S = Z^*[H - L_S]$. Hence $|\Delta T_S| = Z^* \Delta L_S$, or $Z^* = |\Delta T_S|/\Delta L_S$. The master will *not* move his serfs down the Z^* ray so long as $\Delta L_S R_L > |\Delta T_S| R_T$, that is, $R_L/R_T > |\Delta T_S|/\Delta L_S$, or, $R_L/R_T > Z^*$.

the serfs are kept at point B, T_S and L_S will remain constant, in contrast to the reduction in T_S and the increase in L_S , which a further movement down the isoquant—now forbidden by the Inventories—would have produced. As we saw in the First Model, this movement was required to maintain equal land/labor ratios on both parts of the estate and thus keep serfdom efficient. Without the movement, the master ends up with a lower land/labor ratio than he would wish to have, given the number of serfs. Consequently the Inventories reduce R_L and raise R_T on the demesne: this is the second reason for the weakening of the inequality in Expression (2). A lower land/labor ratio on the demesne implies a higher ratio on the serfs' land. Hence serfdom is made inefficient: the total output of the estate and the master's income are reduced, while the serfs, still allotted the time and land corresponding to point B, gain nothing.

(3) With a still larger number of serfs, at or below point C (128 in our example), the inequality in Expression (2) no longer holds. The master now has all the labor he needs (given Z^*) and does not wish to trade any more land for labor. The size of the demesne, the labor input on it, and his income all become constant. In fact, so long as he obtains this optimal quantity of labor input without encroaching on his serfs' subsistence (which would occur below point N), the master does not care how many serfs he owns.³³ He can now deal with the serf community as a unit that supplies a constant total labor input on the demesne in exchange for a constant quantity of land, and distributes both the land and the obligations for labor among its members at its own discretion. The efficiency of serfdom is not restored because the land/labor ratio on the demesne remains lower than on the serfs' land. Compared with its pre-Inventory level, the master's income is permanently reduced, but the position of his serfs may finally improve because, with the inequality in Expression (2) gone, the master need not interfere with their movement down the Z^* ray, to a point such as D. Unless his serfs can be used off the estate, the master has no need for additional ones, and serfdom enters the twilight zone described in the First Model.

At this point an interesting development occurs. As we have just seen, the master no longer cares how many serfs live on his estate. But his serfs do. The higher land/labor ratio on their part of the estate results in a higher R_L/R_T ratio as well, and preserves the inequality (2) on *their* land. Hence, the serfs will be willing to trade some of their land for labor at the exchange rate Z^* (just as their master did earlier) if they can find new serfs to trade with. Since all estates are assumed here to be in the same position, additional serfs can be obtained from natural increase

³³ The minimum number of serfs that allows the master to obtain this maximum income is obtained by solving the equation $(HZ^*S - \alpha T)^{\alpha}/S = E(Z^*)^{\alpha}/(\alpha T)^{\beta}$ for S . The maximization of $Y_M = L_M^{\alpha}T_M^{\beta}$ subject to $Z^* = T_S/[H - L_S] = [T - T_M]/L_M$ gives $T_M = \beta T$ and $L_M = \alpha T/Z^*$, both expressions being independent of S .

only, but the serfs might wish to petition the master not to free any of them unless they are all set free.³⁴

(4) Finally, when the number of serfs reached 278, the ratio of the marginal products of labor and of land on the serfs' part of the estate comes down to Z^* , and no additional serfs are wanted.³⁵ The land/labor ratios on both parts of the estate are equalized, and the earlier inefficiency introduced by the Inventories now disappears. But the serfs do receive a larger part of the estate's total income and each of them is better off. Thus, in relatively thickly settled areas, the Inventories can fulfill the government's objective of improving the serfs' welfare without making serfdom inefficient. Whether this actually happened remains to be investigated.³⁶

THE FOURTH MODEL—SERFS ON *OBROK*

Obrok (or quitrent) was the payment made by the serfs to the master, usually in money, in lieu of labor services. On estates where the *obrok* system dominated, most of the land was allotted to serfs.

According to the data submitted by the masters on the eve of the Emancipation, the occurrence of the *obrok* system had a distinctly regional character. The highest proportions of serfs on *obrok* were in the Central Industrial Region (58.5 percent) and in the Lake Region (47.0 percent). Next came the Central Agricultural (23.7 percent) and the Volga (23.0 percent) regions. All of these areas are in Great Russia; outside of it, the *obrok* system was almost nonexistent.³⁷

The high fraction of *obrok* serfs in the Central Industrial and Lake Regions is easy to explain. The poor soil and harsh climate of these regions had forced peasants from time immemorial to engage in crafts, trapping, trade, construction, transportation, and other nonagricultural pursuits. By imposing an *obrok* in lieu of relatively unprofitable agricultural labor services the masters were able to tap the serfs' nonagricultural earnings. But why was this system not used more widely? Even in the Central Industrial Region some 40 percent of serfs rendered labor services; in the Lake Region, more than 50 percent. Nor is there clear evidence that the use of *obrok* was becoming more prevalent over time.³⁸

³⁴ The collective responsibility of peasant communities for tax collection created a similar situation in old Muscovy, where the old-timers objected to the departure of any members. See Domar, "The Causes," p. 25.

³⁵ The number of serfs that maximizes the income of each serf is $\alpha T / \beta H Z^*$.

³⁶ Since the Inventories have the effect of reducing the optimal number of serfs on the estate, they make serf agriculture less labor-intensive in the long run. These enactments, or similar ones in other countries, can thus create a class of landless peasants that, strangely enough, can coexist with serfdom.

³⁷ See Skrebitskii, *Krest'ianskoe* [Peasant], vol. 3, pp. 1228–65.

³⁸ See Koval'chenko, *Russkoe* [Russian], pp. 62–63; Semevskii, *Krest'iane* [Peasants], pp. 48–51, 591–92; and Blum, *Lord*, pp. 394–401. Although there were regional variations between the two periods, the totals for the whole country remained stable.

And yet, even in the absence of nonagricultural earnings, the *obrok* system had a number of obvious advantages for both sides. It reduced the masters' managerial responsibilities, particularly bothersome for the many civil and military servants among them, and gave the serfs greater freedom and opportunity which, according to traditional wisdom, should have increased their earnings. It would seem that this system should have been dominant even in areas of excellent soil and climate such as the Ukraine, where agriculture was a full-time occupation. But there it was hardly used.

Obviously, many masters must have had good reasons for preferring labor services to *obrok*. We considered a number of possible reasons, such as economies of scale, superior management on the demesne, or the serfs' unwillingness to bear risk, but found none of them convincing. The only explanation to survive our examination was the difficulty of collection. No serf could fall far behind in rendering labor services. In contrast, the *obrok* was collected at stated intervals, such as twice a year. If the serf failed to pay, the master could use threats and punishments, but, judging by the laments of peasant elders and the complaints of professional managers of their inability to collect the arrears, such threats must have been limited in their effectiveness.³⁹ Perhaps in the industrialized areas the serfs derived steadier incomes from diversified sources. They may also have been more vulnerable to the master's threat to revoke or not to extend their passports. It is ironic that the institution of serfdom exacerbated this problem: under freedom, a nonpaying tenant could simply be evicted.

Did Paul's Law and the Inventories encourage the shift to the *obrok* system? So one would expect, since these laws made services less profitable while not touching the magnitude of the *obrok*. But Paul's Law was effective only in sparsely populated areas, like the East and the South, where the *obrok* system was uncommon. The Inventories should have been effective in well-settled areas, like the Southwest, and yet labor services completely dominated there. Perhaps the Inventories were introduced too late to produce a change, or the local masters, reputed to be efficient, gained more from labor services.

Whatever the virtues and defects of the *obrok* system were, did it reduce the profitability of Russian serfdom and hasten its end? Soviet

³⁹ The difficulty of collection is stressed by Samarin. He also asserts that it is dangerous for peasants used to living and working under their master's supervision to be transferred to the *obrok* system. See his *Sochineniia* [Collected], vol. 3, pp. 44, 233–48. On the master's choice between labor services and rent there exists a considerable literature. See, for instance, Koval'chenko, *Russkoe* [Russian], pp. 163, 207, 212–13, 222; Fedorov, *Pomeshchich'i* [Landowners'], p. 29; Aron Katsenelinboigen, "Disguised Inflation in the Soviet Union: The Relationship Between Soviet Income Growth and Price Increases in the Postwar Period," in Alan Abouchar, ed., *The Socialist Price Mechanism* (Durham, North Carolina, 1977), p. 174, note 2; Folke Dovring, "Bondage, Tenure, and Progress," *Comparative Studies in Society and History* (April 1965), 309–23; and Stefano Fenoaltea, "Authority, Efficiency, and Agricultural Organization in Medieval England and Beyond: A Hypothesis," this JOURNAL, 35 (Dec. 1975), 693–718.

historians attach tremendous importance to the supposed shift from labor services to money payments, and see in it the end of feudalism (whatever meaning this term might have in the Russian context), the beginning of capitalism, and evidence of the general crisis of serfdom.⁴⁰

It is possible that in Western Europe the replacement of labor services by money payments did have such an effect: once the level of these payments became fixed, their real value could be destroyed by subsequent inflation.⁴¹ But in Russia the *obrok* levels were not fixed. They were set by the masters and, as Blum has shown, they kept pace with inflation.⁴² Nor were the masters precluded from demanding larger payments from particularly prosperous serfs engaged in crafts or trade. Indeed, far from destroying serfdom, the *obrok* system was likely to make it more flexible and long-lived.

The system facilitated the entrance of serfs into nonagricultural pursuits. A serf engaged in such activities would need little, if any, land and hence would cost his master little or nothing. His potential land allotment, in whole or in part, could be used by another serf or by the master, thus alleviating the diminishing marginal productivity of labor on the demesne, a potential threat to the profitability of serfdom. There was no limit to the number of *nonagricultural* serfs that a master might wish to own.

This system also had a more direct effect on serfdom. A man on *obrok* remained a serf only to his master. To the outside world, he was almost a free man who could take on jobs, enter into contracts, buy and lease land, hire labor, and even own serfs, all in his master's name. On some large estates such a serf had a dual relationship with his master. As a serf he had to pay the *obrok*; but like a free man, he could take a job on his master's estate or lease his master's land.⁴³ This remarkable combination of serfdom and freedom allowed him to work as effectively as a free man (if free men indeed worked more effectively than serfs) and still satisfy his master. Admittedly, for the serf it was not an ideal relationship. Besides paying the *obrok* set by the master and obtaining nothing in return, he was subject to his master's whims: his passport could be revoked, forcing him back to the estate; he had to hide his wealth lest his *obrok* be raised; and any property bought in his master's name could be seized by its legal owner.⁴⁴

⁴⁰ See the sources cited in footnote 1.

⁴¹ It was shown in the First Model that rising land values could destroy the profitability of fixed arrangements under serfdom.

⁴² See Blum, *Lord*, pp. 449–51, and Koval'chenko, *Russkoe* [Russian], pp. 131, 295–97. The latter claims that in the nineteenth century the magnitude of *obrok* was increasing in real terms.

⁴³ See Indova, *Krepostnoe* [The serf], pp. 178–82; Fedorov, *Pomeshchich'i* [Landowners'], pp. 42–50; and Koval'chenko, *Russkoe* [Russian], p. 151.

⁴⁴ Some serfs, particularly those who belonged to wealthy masters, did get some benefits from this arrangement, such as support during famines and protection against other noblemen and government officials. In Turgenev's famous story, "Khor' and Kalinych," Khor', a wealthy *obrok*-paying serf, does not want to acquire his freedom because then "every beardless person would be [his] boss" (noblemen and government officials wore no beards). (*Zapiski Okhotnika* [Sportsman's sketches] (Moscow, 1961), p. 13).

From the master's point of view, however, it was an excellent arrangement. While the *obrok* contained some agricultural rent for serfs still engaged, at least part-time, in agriculture, for others it was simply a crude income tax imposed on them by their masters, a sort of an old-fashioned tribute. Its magnitude was not restricted by law. It could exist forever if only the masters were able to collect it. So long as they could, the masters had not the slightest reason for renouncing serfdom.

III. AN EMPIRICAL INQUIRY

An ideal set of data required for investigating changes in the profitability of Russian serfdom would consist of time series observations on receipts, expenditures, and sales values for a suitably representative sample of serf estates. The records left by some large landowners have been examined by Soviet scholars, but to our knowledge, no comprehensive investigation has been undertaken. A somewhat less ideal, but still satisfactory, set of data would consist of time series of serf prices, by provinces or regions, for the several decades preceding the Emancipation. A persistent and widespread fall in these prices could be taken, in our opinion, as evidence that serfdom was nearing its end.⁴⁵ We have not been able to discover such a series. Indeed, the most patient scholar would be challenged to construct one from the scattered bits and pieces of data that are available. Most serfs were sold with land; hence, the problem of separately determining serf and land prices, which we are about to face, would remain.

The most important source which has been used by historians consists of data on land sales over the period 1854–1858 (inclusive), published by the Land Department of the Ministry of the Interior in 1859.⁴⁶ The data are reported by county (*uezdy*) within each province (*gubernii*), and are divided into sales of populated land (that is, land with serfs) and unpopulated land. For each county and type of land, the report gives the number of sales, the total value of sales, the total area in *desiatinas* (1 *desiatina* = approximately 1.09 hectares), and (for populated land) the total number of serfs, summed in each case over the entire five-year period. In addition, the official prices per *desiatina* and per serf are listed.⁴⁷

We are told in the introduction that the original data had been edited to eliminate extreme and unusual cases.⁴⁸ In addition, we are warned

⁴⁵ See the discussion at the end of the First Model.

⁴⁶ "Svedeniia o prodazhnykh tsenakh na zemli" ["Data on selling prices of land"], *Zhurnal ministerstva vnutrennikh del* [Journal of the Ministry of Interior Affairs] (1859), book 7, pp. 1–46, book 8, pp. 95–118.

Early in this century, Maslov, *Agrarnyi* [The Agrarian], vol. 1, pp. 463–64, used these data to show that serfdom had become unprofitable. But he did not calculate serf prices separately from land prices. Blum did. See *Lord*, p. 372.

⁴⁷ Additional details of these data are given in the Statistical Appendix.

⁴⁸ The name of the editor is not given, but, according to D. I. Rikhter, he was the well-known statistician A. G. Troinitskii. See D. I. Rikhter, "Zabytyi material po statistike prodazhnykh tsen

that the values of many transactions might have been understated in order to reduce transfer duties, but that the prices of patrimonies might have been overstated in order to protect buyers from possible redemptions.⁴⁹ On the whole, it is felt that understatement prevailed. The editor regarded the data to be useful for estimating average land prices, but urged the readers to use other sources as well. The official land and serf prices given for each province were stated to be "almost everywhere below actual prices" (see Table 2 below).⁵⁰ If so, these official prices might indicate the minimum levels of actual prices and thus might provide a useful check on our estimates. Indeed, with only one exception, the official prices of unpopulated land were found to be below the reported prices, and usually with a wide margin. But for populated land (serf estates) the sums of the values of the land and serfs based on official prices exceeded the reported values of the estates in 18 out of 42 provinces. If the reported sale values had a downward bias, why were the prices of populated estates particularly affected? Were these transactions easier to underreport because of their greater complexity? Or did the prices of serf estates suffer a large decline that had occurred too recently to be reflected in official prices? We shall return to the question below.

Comparing the sales data with the official statistics on serf estates we find that, with some regional variation, the sales reports covered 3.6 percent of all land on serf estates in the country and 3.7 percent of all serfs.⁵¹ The near equality of the two percentages suggests that the land/serf ratio in the sales reports must have been reasonably close to the average for all estates. However, the average number of serfs and *desiatinas* per sale constituted only some 80 percent of the corresponding averages for all estates, suggesting either that large estates were sold less frequently than smaller ones, or that they were excluded by the editor as "unusual cases." Since large estates usually commanded proportionately lower prices than smaller ones, the exclusion would lend an upward bias to the values in the sales data.

Several historians have attempted to estimate serf prices or the value of the land allotted to former serfs by the Emancipation from these data by assuming that the price of populated land was equal to that of

na zemliu" ["Forgotten materials on the statistics of selling prices of land"], *Trudy Imperatorskogo Vol'nogo Ekonomicheskogo Obshchestva* [Works of the Imperial Free Economic Society] (1897), vol. 2, book 4, pp. 1-28.

⁴⁹ According to Blum, *Lord*, p. 81, the redemption period was 40 years before 1830 and three years between 1830 and 1917.

⁵⁰ "Svedeniia" ["Data"], p. 3.

⁵¹ This implies that on the average some .7 percent of all serfs were sold per year. A small fraction should be added to this number to include serfs (servants, craftsmen, and so on) sold without land.

According to R. W. Fogel and S. L. Engerman, 1.92 percent of the slave population of Maryland was sold each year in the period 1830-1840. They accepted this figure as the national average. See their *Time on the Cross: The Economics of American Negro Slavery* (Boston, 1974), vol. 1, p. 53.

unpopulated land in any given area. (The price of unpopulated land could be easily calculated.)⁵² In doing so they disregarded a specific warning against making this assumption recorded in the discussions of some provincial committees prior to the Emancipation, because unpopulated land was bought in small quantities, and usually as increments to estates. Indeed, the average quantity of unpopulated land sold was only some 12 percent of that of populated land, and in some regions this fraction was much smaller.⁵³

Even if the two land prices were equal for each province, there would still remain at least two methods of calculating the serf price for a given region: (1) a single weighted average land price for the whole region could be calculated first and then applied to the total (regional) value of the estates, or (2) serf prices could be obtained for each province separately and then averaged for the whole region. (The second method could start at the county level, but we did not undertake such an ambitious task.) The second method, which appears to make a bit more sense, is likely to yield lower serf prices than the first, which is confirmed by a comparison of the figures in Columns 1 and 2 in Table 2.⁵⁴ Blum must have used the first method; his prices are so close to those in Column 1 that they are not reproduced here.

⁵² In addition to Maslov and Blum (see footnote 46 above), this assumption was made by Gerschenkron, "Agrarian," p. 738; Liashchenko, *Istoriia* [History], vol. 1, p. 584; Pokrovskii, *Russkaia* [Russian], vol. 4, p. 93; G. T. Robinson, *Rural Russia under the Old Regime* (Berkeley, 1932, 1960), p. 88; and others who were interested in the fairness of prices charged to former serfs for land allotted to them by the Emancipation.

⁵³ Skrebetskii, *Krest'ianskoe* [Peasant], vol. 3, p. 17. In some regions, like Lithuania, White Russia, and Little Russia, these percentages were even smaller: 4.4, 2.7, and 5.3 respectively. For the country as a whole, the quantity of unpopulated land sold was some 24 percent of total land sold; in White Russia it was only 8.6 percent, and in the Southwest—a tiny 2.8 percent.

⁵⁴ Indicating the first and second methods by superscripts, we can express the regional serf prices obtained under each method by

$$P_S^1 = \left(\frac{1}{\Sigma S} \right) \left(\Sigma V_p - \frac{\Sigma P_{Tu} T_u \cdot \Sigma T_p}{\Sigma T_u} \right) \quad (1n)$$

and

$$P_S^2 = \left(\frac{1}{\Sigma S} \right) [\Sigma V_p - \Sigma P_{Tu} T_p] \quad (2n)$$

where V_p is the value of populated estates; S and T_p are the number of serfs and the amounts of land, respectively, on such estates; T_u is the amount of unpopulated land sold; and P_{Tu} is the price of unpopulated land. It is obvious from (1n) that in the first method the average price of populated land in each region is the weighted average of prices of unpopulated land in each province weighted by the provincial quantities of unpopulated land. In the second method (2n), it is the provincial quantities of populated land that are used as weights, a procedure that seems to us more justifiable than the first.

From (1n) and (2n) it can easily be deduced that $P_S^1 > P_S^2$ if and only if

$$\frac{\Sigma P_{Tu} T_u}{\Sigma T_u} < \frac{\Sigma P_{Tu} T_p}{\Sigma T_p} \quad (3n)$$

A negative relationship between quantities and prices has been found by Gerschenkron and others. See his *A Dollar Index of Soviet Machinery Output, 1927-28 to 1937* (Santa Monica,

TABLE 2
PRICES OF SERFS OBTAINED BY DIFFERENT METHODS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	On the Assumption that Prices of Populated and Unpopulated Land Are Equal									
	By First Method	By Second Method								
Percentages of Values of the Estates										
	By First Method	By Second Method	By Regression	Based on obrok	Official Prices	From col. (1)	From col. (2)	From col. (3)	From col. (5)	Real Prices of Serfs
Major Regions ^a										
Central Industrial	40.8	34.3	122.8 ^b	125.2	106.1	24.0	20.2	72.3	62.4	42.1 ^b
Central Agricultural	32.8	22.3	80.8	90.3	120.0	16.9	11.5	41.7	61.9	35.7
Lake	60.3	29.8	152.8	108.9	97.3	32.9	16.2	83.3	53.0	37.6
Lithuania	5.5	13.1	47.2	—	119.2	2.7	6.6	23.7	60.0	9.2
White Russia	7.0	10.8	151.6 ^b	—	86.1	4.7	7.3	102.5	58.2	34.4 ^b
Little Russia	36.1	36.7	92.5	—	109.2	19.8	20.2	50.9	60.0	32.7
Southwest	126.0	62.6	156.5	—	120.0	58.7	29.2	72.9	55.9	45.9
New Russia	136.4	67.6	113.3	—	120.0	36.1	17.9	30.0	31.8	22.0
Volga	71.1	32.4	65.7 ^b	84.7	120.0	42.0	19.1	38.8	70.8	31.9 ^b
Viatska-Perm'	20.7	44.0	78.3	—	90.0	15.6	33.2	59.1	68.0	39.9

^a For the list of provinces in each region see the tables in the Statistical Appendix.

^b Weighted average of provincial prices.

Sources and methods: Cols. (1) and (2): All data, including the number of serfs used as weights, taken from the sales reports in "Svedeniia" ["Data"]. Col. (3): Prices taken from Appendix Table 1 in the Statistical Appendix. The number of serfs used as weights for aggregating the provinces in the Central Industrial, White Russia, and Volga regions taken from Troitskii, *Krepostnoe* [The serf], p. 45 (English translation by Elaine Herman [Newtonville, Massachusetts, 1982]), pp. 55-56).

Col. (4): *Obrok* data taken from Skrebitskii, *Krest'ianskoe* [Peasant], vol. 3, 1228-93. *Obrok* per soul capitalized at 8 percent. Non-obrok serfs are assumed to pay the master two-thirds as much as *obrok* serfs. Aggregation weights are the same as in col. (3).

Col. (5): Official serf prices from "Svedeniia" ["Data"]. Aggregation weights are the same as in col. (3).

Cols. (6)-(9): Values of the estates taken from "Svedeniia" ["Data"].

Col. (10): From Appendix Table 2 in the Statistical Appendix. The deflation method is described there. Aggregation weights are the same as in col. (3).

The hypothesis of the equality of the prices of populated and unpopulated land in a given area was subjected to a statistical test and rejected (see the Statistical Appendix). It turned out that populated land was much cheaper than unpopulated—much to our surprise, because we had expected populated land to be of higher quality and in better locations. More about land prices will be said below.

Having rejected the hypothesis that the prices of populated and unpopulated land in a given area were equal, we estimated the prices of serfs and of populated land by the regression

$$V_p = c + P_S \cdot S + P_{Tp} \cdot T_p \quad (3)$$

where V_p is the total sales value of the populated estates sold in each county over the sample period, S is the number of serfs on the estates, and T_p is the amount of land on the estates, so that the coefficients P_S and P_{Tp} would give the prices of serfs and of populated land (c is a constant term). (The Statistical Appendix gives details.) The results are presented in Column 3 of Table 2. In the Central Agricultural, Lake, Lithuania, Little Russia, Southwest, New Russia, and Viatka-Perm' regions the regional serf prices were estimated directly by Regression Equation (3). In the other areas, that is, in the Central Industrial, White Russia, and the Volga regions, the hypothesis of a uniform serf price over the region was rejected, and the prices in Column 3 are weighted averages of our provincial serf price estimates.

With the exception of Lithuania (see below) and the unimportant Viatka-Perm' region, the direct estimates of the regional serf prices presented in Column 3 of Table 2 are statistically significant (at the 95 percent confidence level), but a more detailed examination of our estimates given in Appendix Table 1 in the Statistical Appendix reveals a number of problems. In three provinces (Moscow, Saratov, and Orenburg), the provincial estimates of the serf prices are negative, although not significantly so.⁵⁵ In the Central Industrial and Lake

California, 1952). For a mathematical treatment of the "Gerschenkron Effect" see E. Ames and J. A. Carolson, "Production Index Bias as a Measure of Economic Development," *Oxford Economic Papers*, 20 (March 1968), 12–24. If this effect holds for quantities and prices of land as well, then a negative relationship between the prices and quantities of unpopulated land is more probable than between the prices of the former and the quantities of populated land; hence, this inequality is likely to be true more often than not.

⁵⁵ The negative Moscow price is obviously wrong. In the adjacent province of Vladimir, the serf price was a suspiciously high 211.82 rubles—the highest of all shown in Appendix Table 1 in the Statistical Appendix. Sixty-five percent of all serfs in the Moscow province were on *obrok*, paying an average annual sum of 10.84 rubles. Capitalized at 8 percent per year, this would amount to a price of 135.50. Assuming that non-*obrok* serfs were only two-thirds as profitable as the ones on *obrok*, we obtain 120 rubles as the average serf price. Even if the non-*obrok* serfs were completely useless to their masters, the average serf would still be worth 88 rubles. For the Saratov and Orenburg provinces, where the proportions of *obrok* serfs were only 30.8 and 8.6 percent respectively, such an exercise is less meaningful, but, for whatever it is worth, the assumption of two-thirds would yield prices of 82 and 84 rubles, respectively. Of course the 8 percent

regions, the spread of serf prices among the component provinces looks suspicious. In seven provinces and one whole region (White Russia), the estimated land prices are negative, although again none of them significantly so. The generally low significance and high standard errors of these estimates are presumably due to the high degree of correlation (collinearity) between the number of serfs and the quantity of land ($r = .80$).

Further problems are created by the heterogeneous character of labor and land as well as the practice of reporting the number of serfs solely in terms of males ("souls"), both of which may be shown to be possible sources of bias in our estimates of the prices of land and serfs. In addition, the Russian custom of expressing a serfowner's wealth and status in terms of the number of souls he owned, and thus neglecting the quantity (and quality) of land in evaluating estates, might also have contributed to our comparatively low populated-land price estimates.⁵⁶ Finally, two special causes might have depressed the prices of populated estates below their normal capitalized values and thus have resulted in lower prices of both land and serfs:

(1) In the middle of our period (1854–1858 inclusive), Alexander II made his famous announcement (on March 30, 1856) that the end of serfdom was in sight. Since the terms of Emancipation were not to be known for several years, the increased uncertainty might well have depressed the prices of serf estates and hence the prices of their land and serfs. In many areas, as noted above, the actual land and serf prices were found, surprisingly, to be below their official prices.

(2) Perhaps the most important reason for the low prices of serf estates was the legal restriction of their ownership to the members of the nobility, who were notoriously short of funds.⁵⁷

capitalization rate and the assumption of two-thirds are arbitrary, but it is clear that any reasonable change in these magnitudes would also fail to reduce the serf prices in these three provinces to zero. (Sources are given in Table 2.)

The land redemption bonds given to the former serfowners after the Emancipation carried an interest rate of 6 percent per year. Hence the 8 percent capitalization rate used here looks reasonable. Although every serf was mortal, he or she was expected to leave offspring.

⁵⁶ See Domar, "The Causes," p. 26, and Blum, *Lord*, p. 367. According to Pokrovskii, *Russkaia* [Russian], vol. 4, pp. 9–10, Nicholas I suggested to one of the committees on the peasant question that it should be forbidden to sell estates or to grant mortgages, unless the number of *desiatinas* was indicated next to the number of souls. In spite of this, published official statistics on mortgages of populated estates indicated the number of (male) serfs but not the quantity of land. See "Bankovye dolgi i polozenie gubernii v 1856 godu" ["Bank debts and the condition of provinces in 1856"], *Zhurnal ministerstva vnutrennikh del* [Journal of the Ministry of Internal Affairs] (1856), part 3, book 2, pp. 199–234. Many other examples can be given.

⁵⁷ For the nature of this restriction, see A. Romanovich-Slavatinskii, *Dvorianstvo v Rossii ot nachala XVIII veka do otmeny krepostnogo prava* [Nobility in Russia from the beginning of the eighteenth century to the abolition of serfdom] (St. Petersburg, 1870), pp. 272–86.

In D. Butovskii's note, "Prodazhnye tseny na zemli v Poltavskoi gubernii" ["Selling prices of land in Poltava Province"], *Zhurnal ministerstva vnutrennikh del* [Journal of the Ministry of Internal Affairs] (1860), book 1, pp. 1–8, the author remarks that Cossack lands in that province

Unfortunately, we do not know the net effect of all of these factors on our serf price estimates. Their reliability must be very modest at best. For this reason we also list in Table 2 the results of several other calculations, including one based on the official serf prices (Column 5). Columns 6 through 9 give the relative values of serfs as percentages of the total values of the estates to help our readers to form their own conclusions.

It is our impression that in the Central Industrial and Lake regions the main source of the serfowners' wealth was in serfs and not in land, while the opposite was true in the Black-soil areas. If so, our estimates of serf prices in Column 3 look reasonable in the first three regions, completely wrong in White Russia, not unreasonable in Little Russia, overstated in the Southwest, and possibly understated in New Russia and the Volga regions (although male serfs in these last two regions constituted only 24 percent and 27 percent of all males respectively). Viatka-Perm', with its small number of serfs, is of little importance, and Lithuania represents a special case to be discussed below.

Our original intention was to test the hypothesis that serf prices were negatively correlated with the density of the serf or of the entire agricultural population and thus to be able to estimate the population density which would reduce serf prices to zero (if they were positive to begin with). This naive idea had to be abandoned. First, the serf population grew very little during the several decades preceding the Emancipation (although the free population continued to grow). Second, and more important, we found no relationship between real serf prices and land endowment per serf. We should have anticipated that the relationship between these two variables could go either way, depending upon soil, climate, and particularly on the presence of nonagricultural pursuits, such as existed in the Central Industrial and Lake regions.⁵⁸

We did try another experiment—namely, the deflation of serf prices by the local prices of grain (see Appendix Table 2 in the Statistical Appendix). The regional results are given in Column 10 of Table 2. If our indices of grain prices were less crude and our serf price estimates more reliable, the results of this deflation would be of considerable

sold "incomparably" cheaply because only Cossacks were permitted to buy them. He also asserts that land prices in the sales reports ("Svedeniia" ["Data"]) were greatly understated.

Samarin, *Sochineniia* [Collected], vol. 2, p. 121, advocated that personal noblemen, honorary citizens, and merchants of the first two classes be permitted to buy populated estates. As a result of this measure, he expected the prices of these estates to rise. (He also expected the new owners to run their estates more efficiently.)

⁵⁸ In pre-famine Ireland (1841), village industries were found to be economically important, and the relationship between income and the land/labor ratio was negative. See Eric L. Almquist, "Pre-Famine Ireland and the Theory of European Proto-Industrialization: Evidence from the 1841 Census," this JOURNAL, 39 (Sept. 1979), 699-718, and Joel Mokyr, "Malthusian Models and Irish History," this JOURNAL, 40 (March 1980), 159-66.

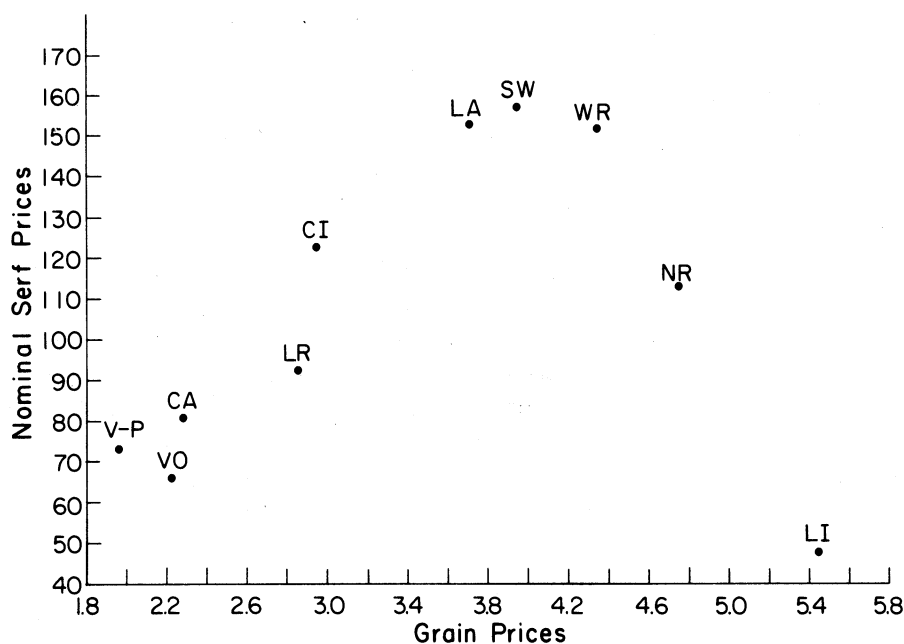


FIGURE 4
THE RELATIONSHIP BETWEEN THE NOMINAL PRICES OF SERFS
AND THE PRICES OF GRAIN

Note: V-P—Viatka-Perm'; VO—Volga; CA—Central Agricultural; LR—Little Russia; CI—Central Industrial; LA—Lake; SW—Southwest; WR—White Russia; NR—New Russia; LI—Lithuania.

Sources: Table 2 and sources of Appendix Tables 1 and 2 in the Statistical Appendix.

interest. We shall treat both the grain price indices and the serf price estimates as if they were reliable, but with a clear warning to the reader. Figure 4 may help the reader to obtain a quick grasp of the relationship between nominal serf prices and the prices of grain.

The deflation of nominal serf prices by grain prices greatly reduces their variation across regions, lowering the coefficient of variation from .32 to .23. If we remove Lithuania (see below), this coefficient falls almost by half from .29 to .15. The ratio of the highest regional real serf price (in the Southwest) to the lowest (in New Russia) becomes only about 2, and as observed above, the former price was probably overstated and the latter understated.⁵⁹

The results lead to two conclusions. The first is obvious: grain prices must have accounted for a large, and probably the largest, part of the regional variation in nominal serf prices.⁶⁰ The second is more interest-

⁵⁹ The ratio of the weighted slave price in the Lower South to that in the Upper South in the United States was 1.82 in 1830–1835 and gradually declined to 1.28 in 1856–1860. See Fogel and Engerman, *Time*, vol. 2, p. 73. The ratio of the highest to the lowest *state* price, however, would be more relevant here.

⁶⁰ This positive correlation between regional grain and serf prices adds a bit more evidence against Pokrovskii's hypothesis examined in the First Model.

ing. Since in Russia the masters decided where the serfs would live and work, an active interregional serf market would have transferred serfs from areas of low to high nominal serf prices and thus would have brought about a greater regional equality of nominal as opposed to real serf prices. This did not happen. Hence, the regional mobility of serfs must have been insufficient to lead to their optimal geographical distribution *from the masters' point of view*.⁶¹ A high mobility of free workers, however, would have produced a smaller geographical variation of real wages than of nominal wages—a pattern that we did find in the regional distribution of serf prices. This would imply that the serf sector was closely integrated with the rest of the economy. Although plausible, the conclusion is far from certain: it is quite possible that the regional distribution of nominal and real wages of free workers in Russia, even if it showed the general pattern suggested above, might have been completely different from the structure of serf prices. This important question remains to be investigated.⁶²

Lithuania is clearly a special case. Its estimated nominal serf price was 1.8 standard deviations below the mean of all regions and its real price was 3.3 standard deviations below its mean. If the mean of real prices was calculated without Lithuania, the Lithuanian real price of serfs would be 5 standard deviations below the mean. In all calculations of regional serf prices presented in Table 2, except for those based on official prices, Lithuania was always at, or close to, the bottom, and often by a substantial margin. All this evidence may indicate that Lithuanian masters were close to giving up serfdom. Our sources suggest that they were frightened by the coming introduction of the Inventories. It would be most gratifying to find in their fright the confirmation of the results of our Third Model. Unfortunately, judging by serf prices, the masters in the Southwest, on whom the Inventories had already been imposed, seem to have thrived under them. But it is possible that the high serf prices in this region were caused by special local conditions.⁶³

Except for Lithuania, we found no other region where serfdom was

⁶¹ The regional distribution of labor in a country may have several optimums depending on the goals of the decision-makers (such as serfowners or slaveowners, free workers, central planners, and so on).

⁶² Here are a few straws in the wind: with the exception of the Lake region, the percentage increases (or decreases) in the numbers of serfs and of free males in the period 1835–1859 by regions were positively correlated. The rank correlation between real prices of serfs and of the percentage increases in free males by regions for that period would be reasonably high if not for the low nominal serf prices in New Russia and the Volga regions obtained by our regression. As observed above, these two prices must have been underestimated.

⁶³ See Field, *The End*, pp. 80–81; and Blum, *Lord*, pp. 401, 579. The serfowners in the Southwestern region had a reputation for efficiency. Among other things, they cultivated sugar beets on a large scale.

It is, of course, impossible to judge the effectiveness of any particular set of Inventories without knowing local prices, wages, etc.

coming to an end. (We did find that the serf price in Viatka-Perm' was not significantly different from zero, but the number of serfs there was small and was growing at an exceptionally rapid rate—hardly an indication of the end of serfdom.)⁶⁴ The assertion would carry more weight if it were deduced from the behavior of time series data, but these we do not have.

If the behavior of serf prices before the Emancipation does not on the whole indicate the end of serfdom in Russia, neither do two other facts frequently mentioned by historians: the absence of growth of the serf population and the heavy indebtedness of the serfowners. It is true that between 1835 and 1859 the number of (male) serfs in European Russia remained practically constant, although with considerable regional variation.⁶⁵ But, as was explained by Troinitskii in 1861, and more thoroughly by Hoch and Augustine in 1979, the stagnation was caused not by the absence of natural increase but by other factors, the principal being the transfer of former soldiers of serf origin to the free estate.⁶⁶

It is also true that by 1859 the total debt of serfowners to several governmental institutions had reached what Blum calls the "unbelievable amount" of 425.5 million rubles, involving the mortgage of 42.8 percent of all serf estates and 66.5 percent of all (male) serfs.⁶⁷ These figures give an exaggerated impression, however, of the burden of serfowners' debts: the total value of all serf estates in our sales data was 76.3 million rubles, and constituted only between 3.59 and 3.71 percent of the total value of all serf estates in the country.⁶⁸ Dividing 76.3 million by 3.65 percent (the mean of 3.59 and 3.71) we obtain 2,091 million rubles as the total value of all serf estates in the country. Of this amount, a mortgage debt of 425.5 million rubles constitutes only 20.3 percent. But Blum also mentions private debt. Although its total amount was unknown, in the Voronezh province it was estimated at almost 17 percent of the total debt. Taking this proportion as the national average (as Blum does), we raise the ratio of the debt to the value of the estates to 24.5 percent. Finally, one source mentions another 5.5 million of a special debt to the government, which was not included in the above

⁶⁴ Between 1835 and 1859 the number of serfs in the Viatka-Perm' region increased by 42.1 percent, as compared with an average increase in European Russia of only .95 percent. But these figures may not be completely comparable since they come from two separate sources and are subject to different definitions. The 1835 figures are taken from P. Keppen, *Deviatiaia reviziia: izsledovanie o chisle zhitelei v Rossii* [The ninth census: an investigation into the number of people in Russia] (St. Petersburg, 1857), pp. 199–200, and the 1859 figure from Troinitskii, *Krepostnoe* [The serf], p. 49 (English translation, pp. 61–63).

⁶⁵ See the sources cited in footnote 64.

⁶⁶ See Troinitskii, *Krepostnoe* [The serf], pp. 55–56 (English translation, pp. 68–71); and Hoch and Augustine, "The Tax Censuses."

⁶⁷ See Blum, *Lord*, p. 380. The figures are from Troinitskii, *Krepostnoe* [The serf], p. 65, note 2 (English translation, p. 83, note 2).

⁶⁸ Calculated from data in "Svedeniia" ["Data"]; Skrebitskii, *Krest'ianskii* [Peasant], vol. 2, part 2, pp. 1492–1551; and Troinitskii, *Krepostnoe* [The serf], p. 45 (English translation, pp. 55–57).

figures.⁶⁹ This adds an extra 2.6 percent, bringing the total burden of the serfowners' debt to some 27 percent of the value of their estates. This is a very rough estimate, merely giving an order of magnitude. It is surely exaggerated because the values of the estates, as reported in the sales data, were understated. It does not suggest a light burden, particularly for debtors known neither for their efficiency nor for their business sense, but it does not appear unbearable either, and it is certainly less alarming than the oft-quoted statement that two-thirds of all serfs had been mortgaged.⁷⁰

In any case, the fact that Russian serfowners lived beyond their means—a common trait of the landowning classes—is no evidence that Russian serfdom had become or was becoming unprofitable. It is rather ironic that our only candidate for the termination of serfdom—Lithuania—had the second lowest burden of debt and the lowest percentage of serfs mortgaged.⁷¹

IV. CONCLUDING REMARKS

We have not found that the profitability of Russian serfdom before 1861 was threatened by the rise in grain prices, the growth of population, Paul's Law, or the use of the *obrok* system. The Inventories could have inflicted severe damage and they seem to have done so (or at least were threatening to) in Lithuania, but not in the Southwest or in White Russia.

These conclusions are based on a number of theoretical assumptions and on empirical data of uncertain quality. They should be treated as highly tentative.

STATISTICAL APPENDIX

MARK J. MACHINA

As mentioned in the text, the data consist of five cross-sectional series taken from the cumulative sales data over the period 1854 to 1858. We have for each county: the total value of all populated estates sold during the time period (V_p); the total number of souls

⁶⁹ See Blum, *Lord*, p. 381. The magnitude of the special debt was taken from Skrebitskii, *Krest'ianskii* [Peasant], vol. 4, p. 1241.

⁷⁰ In 1980, the ratio of all liabilities to all nonfinancial assets on American farms was 17.8 percent. See U.S. Department of Agriculture, *Agricultural Statistics 1980* (Washington, D.C., 1980), p. 425.

⁷¹ The regional distribution of the serfowners' debts (without that special amount and without private debts) was taken from Skrebitskii, *Krest'ianskii* [Peasant], vol. 4, pp. 1246–49. We found the lowest ratio of debt to the value of serf estates to be in New Russia—6.4 percent. (That region contained fewer than 400,000 serfs.) In Lithuania it was 12.2 percent. The highest percentage was in the Volga region (29.1), followed closely by White Russia, Viatka-Perm' and the Central Industrial region. A comparison of the burdens of landowners' debts over space and time should be very interesting.

The percentage of Lithuanian serfs mortgaged was taken from Blum, *Lord*, p. 381.

(male serfs) on these estates (S); the total amount of land on these estates (T_p); the total value of all unpopulated estates sold during the time period (V_u); and the total amount of land on these estates (T_u), with values measured in rubles and land measured in *desiatinas*.⁷²

On the assumption that arbitrage led to a uniform implicit price of serfs throughout a given market, we would obtain the valuation equations:

$$V_p = P_S \cdot S + P_{Tp} \cdot T_p + \tilde{\epsilon}_p \quad (1a)$$

$$V_u = P_{Tu} \cdot T_u + \tilde{\epsilon}_u \quad (2a)$$

for each observation (that is, county) in the market, where $\tilde{\epsilon}_p$ and $\tilde{\epsilon}_u$ are error terms with zero means.⁷³ If these valuation equations are correct, and if in addition the price of populated land P_{Tp} is equal to the price of unpopulated land P_{Tu} , then the most efficient means of estimating the serf and land prices in each market would be to stack (that is, combine) Equations (1a) and (2a) and run them over all counties in the market.

To test the hypothesis that P_{Tp} was equal to P_{Tu} , we ran the equation

$$V_p - V_u = c + P_S \cdot S + P_{Tp} \cdot (T_p - T_u) + q \cdot T_u + (\tilde{\epsilon}_p - \tilde{\epsilon}_u) \quad (3a)$$

over the whole country, allowing the coefficients P_S , P_{Tp} , and q to vary by province.⁷⁴ If the prices of populated and unpopulated land were the same in each county, the q coefficients would equal zero. But a test of the hypothesis that all the q coefficients were zero yielded rejection at the 5 percent (and indeed, the 1 percent) level, with 33 of the 42 provinces having negative q coefficients (8 of these significant at the 5 percent level) and only 9 provinces having positive values (with 1 significant at the 5 percent level).⁷⁵ This implies that the price of unpopulated land was generally higher than the price of populated land, so that in particular, the procedure of stacking Equations (1a) and (2a), or alternatively, the method used by Blum, Lord (see the text), would in general lead to upward-biased estimates of populated land prices, and accordingly, downward-biased estimates of serf prices. In light of this, we did not use the data on sales of unpopulated land in our subsequent estimation, and accordingly took as our sample those counties which listed sales of populated estates.

Estimation of Equation (1a) requires both a determination of the size of the "market" in which each county is located, as well as correction of any heteroscedasticity caused by the heterogeneous nature of land and labor and the method of reporting the number of serfs. To see how these latter factors could be a source of heteroscedasticity, note that while S is measured in souls and T_p is measured in physical units (*desiatinas*), P_S

⁷² Besides listing the above values for each county, the report also gives the provincial sums for each of the five series, as well as listing various ratios of these series for each county (T_p/S , V_p/S , V_p/T_p , and V_u/T_u). While these additional listings are strictly speaking redundant, they provide a means of cross-checking the original series for typographical errors. Such a check revealed about a dozen clearly identifiable typos—that is, where a particular correction in the listed data value served to make both the sum and the ratio(s) correct. However, this check also revealed inconsistencies between the original series, their sums, and their ratios, which could not be so easily corrected. Since the original calculations were in all likelihood performed on abaci, whenever there was any discrepancy, we adjusted (or did not adjust, accordingly) the listed data value on the assumption that the calculated sum rather than the calculated ratio was correct. The large number of counties for which *none* of the reported ratios were correct provides a further justification of this procedure.

⁷³ Not all counties reported sales of both populated and unpopulated estates.

⁷⁴ This equation was run over all counties that reported sales of both populated and unpopulated estates.

⁷⁵ The above estimation and test were performed correcting for heteroscedasticity in the manner described below.

and P_{Tp} are most appropriately viewed as the prices per *efficiency unit* of labor and land. Accordingly, our "true" valuation equation is not (1a) but rather

$$V_p = P_S \cdot S^e + P_{Tp} \cdot T_p^e + \bar{\omega}_p \quad (4a)$$

where S^e and T_p^e are the number of efficiency units of land and labor sold in each county, and may be expressed as

$$S^e = (1 + \tilde{\eta}_S) \cdot S \quad (5a)$$

$$T_p^e = (1 + \tilde{\eta}_{Tp}) \cdot T_p \quad (6a)$$

where $\tilde{\eta}_S$ and $\tilde{\eta}_{Tp}$ are random variables with zero means. Substituting (5a) and (6a) into (4a) yields

$$V_p = P_S \cdot S + P_{Tp} \cdot T_p + [P_S \cdot S \cdot \tilde{\eta}_S + P_{Tp} \cdot T_p \cdot \tilde{\eta}_{Tp} + \bar{\omega}_p], \quad (7a)$$

which illustrates why the variance of the error term $\bar{\epsilon}_p$ in (1a) may well vary.

In order to correct for this, we ran Equation (1a) (with the addition of a constant term) over the whole country, allowing the coefficients P_S and P_{Tp} to vary by province. If Equation (1a) were correctly specified and the market areas were at least the size of a province, this regression would yield consistent estimates of the coefficients, and hence consistent estimates $\hat{\epsilon}_p$ of the error terms $\bar{\epsilon}_p$. We then ran the equation

$$\hat{\epsilon}_p^2 = c + \lambda \cdot S + \mu \cdot T_p \quad (8a)$$

over the entire country, with results

$$\begin{aligned} \hat{\epsilon}_p^2 = & 9.39 \cdot 10^7 + 9.77 \cdot 10^5 \cdot S + 4,816 \cdot T_p + \text{error} \\ & (1.83 \cdot 10^8) \quad (1.91 \cdot 10^5) \quad (22,323) \end{aligned} \quad (9a)$$

where standard errors are in parentheses. Since neither the constant nor the coefficient of T_p were significant at the 5 percent level, whereas the coefficient of S was highly significant, we concluded that the variance of the error term in Equation (1a) is proportional to S ,⁷⁶ and in all the following regressions corrected for heteroscedasticity by weighting each observation by $1/\sqrt{S}$.⁷⁷

To determine the appropriate market sizes for serfs and land, we tested the hypotheses that serf or land prices were equal for all provinces in each of the ten regions of the country. Thus, for each region, we began by running Equation (1a) (with the addition of a constant term), allowing land prices to vary by province, and tested the hypothesis that the serf prices P_S were equal for all the provinces within the region. We then tested the hypothesis that the populated land prices P_{Tp} were equal for all the provinces in the region, allowing serf prices to vary or constraining them to be equal according to the outcome of the previous test.⁷⁸ Appendix Table 1 contains our estimates of serf and land prices for each province, with the appropriate market size determined by the above tests.

⁷⁶ We also experimented with adding S^2 , T_p^2 , and other variables to the right side of this equation, with no change in the results.

⁷⁷ That the variance of the error term is essentially proportional to S is highly plausible, since each soul corresponds to a random number of efficiency units of labor (including any attendant women and children), and we might expect this variation to be independent across the S souls in each observation. It is somewhat surprising, however, that the variance of $\bar{\epsilon}_p$ evidently does not depend upon the amount of land.

⁷⁸ All tests were at the 5 percent level. The order of the two tests (equality of serf prices, equality of land prices) was chosen more or less arbitrarily, and upon the assumption that serf prices were more likely to be equalized than land prices (serfs presumably being more homogeneous and more mobile than land). This conjecture is verified by the outcomes of the various tests (Appendix Tables 1 and 2).

The real serf prices reported in Appendix Table 2 were obtained in exactly the same manner as were the prices in Appendix Table 1, except that the series V_p was initially deflated by our provincial grain price series.

As mentioned in the text, two aspects of our data impinge upon the accuracy of these estimates. The high degree of correlation (that is, multicollinearity) between the number of serfs and the amount of land in the sales for each county ($r = .80$) leads to high standard errors of the estimates. A potentially more important problem is that of bias due to possible correlation of the error term with the regressors S and T_p . Unfortunately, a formal test of such correlation is not possible, lacking any variables to use as instruments. Since the results in (9a) suggest that $\tilde{\eta}_S$ is an important source of variability, however, any tendency toward equality in the land/labor ratio measured in *efficiency* units in the sales bundles (or even the ratio of land to total serf population) would imply that high values of $\tilde{\eta}_S$ would be associated with low values of S (male serfs) and high values of T_p (physical land), implying downward biased estimates of serf prices and upward biased estimates of land prices. On the other hand, if it were the case that more productive serfs were sold (or in other words, were bought) more frequently than less productive ones, then high values of $\tilde{\eta}_S$ would be associated with high values of S , resulting in an opposite bias.

APPENDIX TABLE 1
NOMINAL PRICES OF SERFS AND OF POPULATED LAND OBTAINED BY
REGRESSION

<i>Region</i>	<i>Province</i>	<i>Serf Price</i>	<i>Standard Error</i>	<i>Land Price</i>	<i>Standard Error</i>
Central Industrial	Tver'	158	27.8	-0.268	2.98
	Iaroslavl'	157	33.4	1.08	3.79
	Kostroma	149	22.7	-0.809	1.12
	N. Novgorod	120	44.4	15.9	6.71
	Vladimir	212	38.2	-6.18	4.54
	Moscow	-1.62	40.2	33.6	6.27
	Smolensk	80.8	60.2	6.65	6.38
	Kaluga	107	38.1	7.80	4.82
Central Agricultural	Orel	80.8	17.9	18.7	2.85
	Tula				
	Riazan'				
	Tambov				
	Voronezh				
	Kursk				
Lake	Novgorod	153	29.2	1.27	1.08
	Pskov			-0.313	2.64
	St. Petersburg			5.18	2.29
	Vologda			-2.12	2.25
	Olonets			-2.68	4.29
Lithuania	Kovno	47.2	32.2	22.6	2.76
	Vil'na			11.8	3.13
	Grodno			14.0	3.73
White Russia	Vitebsk	142	16.2	-0.416	0.663
	Mogilev	126	11.8		
	Minsk	184	13.7		
Little Russia	Chernigov	92.5	25.1	5.03	3.26
	Poltava			12.2	3.62
	Khar'kov			15.4	2.64
Southwest	Kiev	157	14.3	12.8	2.52
	Volyniia			3.72	1.89
	Podoliia			9.59	2.27
New Russia	Kherson	113	38.0	12.5	1.69
	Ekaterinoslav				
	Tavrida				
Volga	Kazan'	212	42.6	-0.699	3.34
	Simbirsk	45.2	37.1	18.8	4.22
	Penza	109	49.5	8.75	6.95
	Saratov	-7.29	55.6	18.0	6.35
	Samara	127	15.1	3.74	0.931
	Orenburg	-19.4	71.5	11.0	5.94
Viatka-Perm'	Viatka	78.3	53.8	2.08	2.24
	Perm'				

Sources: See Appendix Table 2.

APPENDIX TABLE 2
REAL PRICES OF SERFS AND OF POPULATED LAND OBTAINED BY REGRESSION

<i>Region</i>	<i>Province</i>	<i>Serf Price</i>	<i>Standard Error</i>	<i>Land Price</i>	<i>Standard Error</i>
Central Industrial	Tver'	50.2	9.46	-0.0834	1.01
	Iaroslavl'	55.5	11.4	0.387	1.29
	Kostroma	54.0	7.71	-0.294	0.379
	N. Novgorod	45.7	15.1	6.05	2.28
	Vladimir	70.5	13.0	-2.05	1.54
	Moscow	-0.381	13.7	10.2	2.13
	Smolensk	25.1	20.4	2.12	2.17
	Kaluga	36.7	13.0	2.66	1.64
Central Agricultural	Orel	35.7	7.58	7.77	1.21
	Tula				
	Riazan'				
	Tambov				
	Voronezh				
Lake	Kursk				
	Novgorod	37.6	4.94	0.496	0.235
	Pskov				
	St. Petersburg				
	Vologda				
	Olonets				
Lithuania	Kovno	9.24	6.06	3.77	0.520
	Vil'na			2.30	0.590
	Grodno			2.80	0.703
White Russia	Vitebsk	31.3	3.71	-0.0880	0.151
	Mogilev	30.8	2.70		
	Minsk	40.2	3.13		
Little Russia	Chernigov	32.7	8.90	2.46	1.15
	Poltava			4.96	1.28
	Khar'kov			4.22	0.935
Southwest	Kiev	67.2	3.65	1.83	0.473
	Volyniia	21.2	4.10		
	Podoliia	43.3	3.23		
New Russia	Kherson	22.0	14.3	3.33	0.600
	Ekaterinoslav			2.95	0.903
	Tavrida			1.76	0.492

APPENDIX TABLE 2 (continued)
 REAL PRICES OF SERFS AND OF POPULATED LAND OBTAINED BY REGRESSION

<i>Region</i>	<i>Province</i>	<i>Serf Price</i>	<i>Standard Error</i>	<i>Land Price</i>	<i>Standard Error</i>
Volga	Kazan'	100	19.7	-0.334	1.54
	Simbirsk	21.4	17.2	8.85	1.95
	Penza	57.6	22.9	4.55	3.21
	Saratov	-3.06	25.7	7.59	2.94
	Samara	52.0	6.99	1.53	0.431
	Orenburg	-8.13	33.1	4.53	2.75
Viatka-Perm'	Viatka }	39.9	27.4	1.06	1.14
	Perm' }				

Sources to Appendix Tables 1 and 2: "Svedeniia" ["Data"]. The deflator consisted of a weighted average of prices of rye, oats, and wheat only. The prices of rye (for 1846-1855) and of oats (for 1847-1856) were taken from Koval'chenko and Milov, *Vserossiiskii* [All-Russian], pp. 394-97. Prices of wheat were calculated by us from materials published in a number of issues of the *Zhurnal ministerstva vnutrennikh del* [The Journal of the Ministry of Internal Affairs] for the period 1846-1856. The numerous gaps in the data were filled by us in a "reasonable" manner. The production figures of rye, oats, and wheat for the period 1870-1874 used as weights were taken from Iu. E. Ianson, *Sravnitel'naia statistika Rossii i Zapadno-evropeiskikh gosudarstv* [Comparative statistics of Russia and of West-European countries] (St. Petersburg, 1880), vol. 2, pp. 308-09, 419-21.