ON THE PROFITABILITY OF RUSSIAN SERFDOM

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Why did the Russian government emancipate the serfs in 1861? Of the several explanations offered -- fear of serf revolt by Gerschenkron, raisons d'etat by Blum, cultural factors by Field, military needs by Rieber, the general crisis of servdom by several Marxist historians -- the hypothesis most enticing for an economist was suggested by Pokrovskii: the serfs were freed because servdom had become unprofitable for the masters.\(^1\) It is enticing because, in contrast to fear, reasons of state, culture and military needs, profitability is quantifiable (at least in principle), and the hypothesis can be subjected to a theoretical analysis and, with luck, to an empirical test. More about Pokrovskii's argument and evidence will be said at the beginning of Part III.

In an earlier paper by Domar on "The Causes of Slavery and Servdom: A Hypothesis," no distinction was made between these two institutions.\(^2\) The present paper deals with servdom only and although some of it (Models A and C in Part II) may have a general (or at least, European) applicability, it is particularly directed at the Russian experience. An excellent description of the latter can be found in Blum's classic work.\(^3\) It will therefore suffice to mention here that Russian serfs were mostly peasants who, in exchange for labor services or pay, were allotted land and time to provide for themselves. An estate was usually divided between the master and his serfs, both parts worked by the latter. But in some areas of Great...
Russia (see Model D in Part II) all or part of the estate might be assigned to the serfs in exchange for monetary payment (the obrok).

The theoretical analysis of serfdom is presented in Part II. Part III reports the results of our empirical investigation.

II. THE THEORY OF SERFDOM

The purpose of this Part is to analyze the effects on serfdom of the growth of serf population and of the introduction of certain institutional changes. For this purpose, four models are constructed:

Model A -- without legal restrictions

Model B -- with a limit on labor services and on the sale of land

Model C -- with the so-called "Inventories" introduced in certain Western provinces to regulate the exchange rate between the serfs' labor and land

Model D -- with labor services replaced by obrok.

All these are micro-models dealing with an estate which "represents" all serf estates in the country. Because no transactions within the serf sector are recognized, the number of serfs on the estate, up to a maximum desired by the master, is determined exogenously. The quantity of land is assumed to be constant in the short run, but, subject to some sale restrictions in Model B, variable in the long (because land can be bought from and sold to the free sector).

The first three models are based on the following assumptions:

1. The production on the serfs' and on the master's parts of the estate is subject to the same unchanging technology, with constant returns to scale and with land and labor of uniform quality as the only inputs.
2. The whole land of the estate is utilized. Hence more land for one user means less land for others.

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

4. Each serf's income from the estate must be at least equal to some constant which we call "subsistence."  

5. The net (of seeds and of other expenses) output of an estate and the subsistence of the serfs can be unambiguously stated in real terms.

6. The master aims at maximizing his own income from the estate, subject to assumption (4) and certain legal restrictions in Models B and C.

We are particularly interested in the conditions which would induce our "representative" master to give up serfdom. In that case, it is assumed that he would retain all his land (which was not to happen under the Emancipation) and operate his estate with free labor (workers, sharecroppers or tenants) under competitive conditions. In all models, the existence of house servants and of estate craftsmen (the dvorovye liudi) and of serfs working in the master's manufactures is disregarded.

Obviously, our models represent a highly stylized picture of Russian serfdom.
LIST OF SYMBOLS

\( Y \) -- total income from the estate
\( Y_m \) -- master's income
\( Y_s \) -- income of each serf
\( T \) -- total land of the estate
\( T_m \) -- land worked for the master
\( T_s \) -- land allotment of each serf
\( S \) -- number of serfs (males or "souls")
\( H \) -- total number of hours per week worked by each serf (assumed fixed)
\( L_m \) -- total man-hours per week worked for the master
\( L_s \) -- weekly hours worked by each serf for himself
\( E \) -- subsistence level for each serf

\[ Z = \frac{T_s}{H - L_s} \] -- implicit price or exchange rate for serf labor in terms of land

\( F(L,T) \) -- constant returns production function in terms of labor \( L \) and land \( T \)

\( \alpha, \beta \) -- labor and land coefficients in a Cobb-Douglas production function (\( \alpha + \beta = 1 \))

MODEL A -- WITHOUT LEGAL RESTRICTIONS

The maximization of the master's income in the short run (i.e. with \( S \) and \( T \) fixed) merely requires the optimal division of the land of the estate and of the serf's labor between himself and them, as determined by the solution of the following maximization problem:

(1) \[ \text{Max } Y_m = F(L_m, T_m) \]

subject to

(2) \[ T_m + ST_s = T, \]
(3) \[ L_m + SL_s = SH, \] and
(4) \[ Y_s = F(L_s, T_s) \geq E. \]
Here $T, H, S$ and $E$ are given; $T_m, T_s, L_m$ and $L_s$ are to be determined. In this Model the equality sign in (4) will be binding: the master has no incentive to allow his serfs more than a subsistence income. Since we assume that production exhibits constant returns to scale, it is clear that the solution will satisfy

$$\frac{L_m}{T_m} = \frac{L_s}{T_s} = \frac{HS}{T}. \tag{5}$$

If the production function is specified, the maximization problem can be solved explicitly. Such a solution, with a Cobb-Douglas production function, is given in the Mathematical Appendix and is used in constructing all diagrams, but it is not as interesting as the effects on the four variables $T_m, T_s, L_m$ and $L_s$ of a change in $S$. These derivatives, derived in the Mathematical Appendix in the case of a general constant returns production function, are given in Table 1.

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE SIGNS OF DERIVATIVES WITH RESPECT TO $S$</td>
</tr>
<tr>
<td>IN MODEL A</td>
</tr>
<tr>
<td>$\frac{dT_s}{dS} &lt; 0$ &amp; $\frac{dT_m}{dS} &lt; 0$ &amp; $\frac{dL_s}{dS} &gt; 0$ &amp; $\frac{dL_m}{dS} &gt; 0$</td>
</tr>
</tbody>
</table>

Thus the growth of the serf population reduces the size of each serf's allotment (which is obvious) but gives him more time to work for himself, moving him down the subsistence isoquant as seen in Figure 1. During this process, the master can show apparent magnanimity: he contributes some of his own land to each new serf and reduces the labor obligation of all serfs. Although he cultivates less land on his own, the increase in man-hours available to
All diagrams are based on a Cobb-Douglas production function with $\alpha = .7$, $\beta = .3$ and $T = 1000$. The original $S = 100$. 
him more than compensates for it. The master's ability to impose on his serfs the \textit{optimal for him} combination of $L_s$ and $T_s$ and to change it as needed, without harming them, is of the utmost importance for the preservation of the flexibility and hence of the profitability of serfdom. Customary and legal restrictions (in Western Europe) or legal enactments in Russia (see Models B and C), if enforced, would interfere with this process and reduce the profitability of serfdom.

We would expect that in densely populated areas both serfs' land allotments and labor obligations would be relatively small, as would be the masters' shares of the estates. A quick comparison between the situations in Eastern, Central and Western Europe based on Blum's recent work on the whole confirms this.\textsuperscript{11} Foreign travellers 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 XVIII and XIX centuries in Russia is very difficult to make because the data for the XVIII century are very sketchy and contradictory.\textsuperscript{12} But it is not impossible that the serfs' labor obligations were lighter in the XVIII century (contrary to our model) because Russian serfdom was still developing then and did not reach its peak until about 1800.\textsuperscript{13}

While preparing for l.\textsuperscript{e} Emancipation, the Russian government collected a vast amount of data on the use of land and labor in agriculture. The size of serf allotments did vary inversely with population density, but almost in all areas outside of the Western provinces subject to the "Inventories" (see Model C), serfs were reported to owe three days of labor per week, the maximum allowed by law (see Model B).\textsuperscript{14} To report more would imply
disobedience; to report less would weaken the masters' bargaining position in the forthcoming Emancipation.

The masters' share of the estates is not easy to ascertain because for some regions there are no data; for others, the whole 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 little or no land was cultivated for the masters. Of the two regions with the same fraction of obrok serfs -- the Central Agricultural (23.7 per cent) and the Volga (23.0), the former, the more populated one, had 52 per cent of estate land cultivated for the masters; the latter -- 64 per cent. The data being unreliable, too much should not be made out of this confirmation of our model, but it is consoling.\textsuperscript{15}

In the long run, the master had to decide on the optimal number of serfs and on the quantity of land. In the absence of a free sector, he would welcome an increase in the number of serfs until the marginal productivity of serf labor net of subsistence, and hence the price of serfs, declined to zero. Then he would become indifferent between serfdom and freedom.\textsuperscript{16} In the presence of a free sector, the fall in the marginal productivity of labor on the master's estate might be mitigated by hiring out some of his serfs to the free sector (see Model D) and/or by buying or renting land from the free sector. But there might be special situations when the master was unable to obtain more land (Russian gentry was notoriously short of cash), or when jobs for his serfs in the free sector were not available. In that case, so long as the wage in the free sector was above subsistence, he would refuse to free his serfs even if he did not need additional ones. He might let a serf go, provided a substitute was found, or keep only one son of a deceased father. In such situations,
serfdom may persist, in a way, even with a zero price of serfs (see Model C).\textsuperscript{17}

A fall in serf prices could also be caused by a rise in the interest rate and by many non-economic factors. But at this stage of our work, we will disregard all these considerations and accept a decline of serf prices to zero as a proof of Pokrovskii's assertion that serfdom was on its way out because it had become unprofitable for the masters.

MODEL B -- WITH A LIMIT ON LABOR SERVICES AND ON SALE OF LAND

The restriction of labor services to three days a week was first expressed as an assumption by Emperor Paul I in 1797 and later incorporated in the Law Code of 1832. We will refer to it as "Paul's Law."\textsuperscript{18}

The purpose of this Law was presumably the protection of serfs against excessive exploitation.\textsuperscript{19} It should have been obvious, however, even to the Russian government, that confronted with this restriction alone, the master could easily recompense himself by taking back some of his serfs' land, or demanding additional payments (in money or in kind) as many masters did, or he could place his serfs on obrok which was completely unrestricted by law.

Leaving the obrok method for Model D and disregarding those payments, we shall analyze the effects of Paul's Law with the help of the isoquant on Fig. 1. Let us assume that prior to the passage of the Law, the master placed his serfs at the optimal for himself point D, and that the number of hours OF allowed each serf was below the new legal minimum. (Otherwise, the Law would be ineffective.) The initial effect of Paul's Law is to move the serf off the isoquant to a point G and to make him better off, temporarily, with more time and unchanged land. A strong or greedy master would move his serfs from G to H right away by seizing some of their land. A weaker or a
kinder one might wait until the growth of population on his estate did this job for him by endowing new serfs with land taken exclusively from other serfs. As a result, the master's share of the land might remain constant or even increase until point $H$ is reached.

In any case, point $H$ is not yet optimal for the master. It would become optimal when the population, which at point $G$ was, say 100, reached some 210 "souls" (male serfs) in our illustration. In other words, Paul's Law merely pushed the master, as it were, to a point on the isoquant not yet justified by the existing labor/land ratio on his estate. When point $H$ becomes optimal and thereafter, Paul's Law will become ineffective and we will be back in Model A.

We have no information on the length of time the masters might have taken to move their serfs from point $G$ to $H$. In the country as a whole, serf population grew slowly early in the XIX century and became almost constant after about 1830. It is possible that many serf estates remained in the transition stage (between $G$ and $H$) until the very end in 1861. (It is also possible that Paul's Law was not enforced in the first place.)

Until point $H$ becomes optimal, the master has few decisions to make. With a constant $L_s$ being set by the Law, he merely has to find the corresponding $T_s$, also a constant, from equation (4) and allocate it to his serfs at once or gradually. Depending on his behavior and on population density, the derivatives of our variables in respect to $S$ display quite a variety of signs:
Table 2
THE SIGNS OF DERIVATIVES IN RESPECT TO S
IN MODEL B

<table>
<thead>
<tr>
<th>Derivative</th>
<th>Between G and H</th>
<th>At non-optimal H (Paul's Law effective)</th>
<th>At optimal H and after (Paul's Law ineffective)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{dT_s}{dS} )</td>
<td>&lt;0</td>
<td>0</td>
<td>&lt;0</td>
</tr>
<tr>
<td>( \frac{dL_s}{dS} )</td>
<td>0</td>
<td>0</td>
<td>&gt;0</td>
</tr>
<tr>
<td>( \frac{dT_m}{dS} )</td>
<td>0*</td>
<td>0*</td>
<td>&lt;0</td>
</tr>
<tr>
<td>( \frac{dL_m}{dS} )</td>
<td>&gt;0</td>
<td>&gt;0</td>
<td>&gt;0</td>
</tr>
</tbody>
</table>

^a As described in the text, T may be increasing over time, but not because of a rise in S.

On the basis of this table it is hard to know what to expect. No wonder, some Soviet historians have found masters' shares increasing, and the others -- falling.21 But our main concern is with the effect of Paul's Law on the masters' attitude to serfdom. More specifically, we wish to know what happened to

1. The master's income,
2. The price of land, and particularly to
3. The price of serfs.

The answer to the first question is obvious: by preventing the master from equalizing the labor/land ratios on both parts of his estate, the Law, when effective, simply made serfdom inefficient and reduced the master's income, without necessarily benefiting his serfs.

The answer to the second question is also simple: on the master's part of the estate with fewer man-hours and not less land, the marginal product...
of land and hence its price should fall. The master might try to sell some of it to the free sector were he not restrained by another law restricting the alienation of estate land below a minimum of 4.5 desiatins per soul (one desiatina = 1.09 hectares). But this restriction would matter only in densely populated areas where Paul's Law was unlikely to be effective in the first place. The master might try to hire extra free workers (free to him) or even his own serfs for pay, or lease some of his extra land to them. Finally, he might solve this and other problems by allocating all or most of his land to his serfs in exchange for an obrok which was not limited by law but had some other disadvantages (see Model D). Soviet historians give examples of all these practices without indicating, however, how widespread they were.

On the price of serfs, the effects of Paul's Law turn out to be rather complex. The fall in the labor/land ratio in the master's land must increase the marginal productivity of an hour of serf labor. But each serf now works fewer hours for his master. What happens then to the marginal productivity of a serf? The answer can be found in Fig. 2.

The solid curve ORQ indicates the master's income, as a function of the number of serfs, without Paul's Law (as in Model A). The dotted curve ORUW shows his income under Paul's Law (with \( k = 1/2 \)) after the end of the transition to point H. This curve must be below the solid one, except for a point of tangency R, when the Law becomes ineffective. On the assumption that both curves and their relevant derivatives are monotonic (at least to the left of point R), 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 former must be larger than the latter. Since the slopes of the curves represent the marginal productivity of labor per serf,
it follows that in sparsely populated areas Paul's Law reduced the marginal productivity of a serf, and hence his price; in denser-settled areas it raised both, and in very dense areas, where its presence could really matter, it was ineffective. Since the location of these turning points is empirically uncertain, we cannot make a general statement regarding the effects of Paul's Law on serf prices and on the duration of serfdom.

All this was based on the assumption that the restriction on the master's use of serf labor under this Law was "reasonable" (one-half in Fig. 2). But if the Law commanded that the serfs be allowed as much as, say nine-tenths of their time, then the master would earn less (curve \( OZ \)) than he would under freedom (curve \( OWQ \)) and he would give up serfdom right away. This was clearly not the intention of Paul's Law.

**MODEL C -- WITH THE "INVENTORIES"**

The so-called "Inventories" were (or were to be) introduced into the Western provinces in the eighteen-forties to regularize serf obligations to their masters and thus gain the support of the serfs (many of them Greek-Orthodox) against their masters (mostly Catholic) whose loyalty to the Russian state was suspect. The Inventories did not specify the size of the allotment to be given to each household and the magnitude of labor services demanded from it; they merely established the rate of exchange between them in reference to a standard unit. With some violation of reality, this rate will be treated here as a constant. If the law was to make any sense, it had to be more favorable to the serfs, that is higher, than the one originally imposed by the masters.
This rate, defined as $Z = \frac{T_S}{H - L_S}$, is simply the price of serf labor in terms of land. It existed implicitly in Models A and B as well. In Model A, it was not a constant: as would be expected, it declined with the growth of the number of serfs (see the Mathematical Appendix). In Model B, $L_S$ was fixed by Paul's Law and $T_S$ -- by the master's response to it; hence $Z$ was fixed as well, so long as the Law remained binding. What then is the difference, if any, between Models B and C?

In Model B, the master was moved to a position which might become optimal for him in the future, with a larger serf population; this meant a reduction in the existing (implicit) $Z$. The Inventories, by increasing $Z$ did exactly the opposite: they moved the master to a situation which might have been optimal for him in the past, when the number of serfs was smaller. And both laws were supposed to benefit the serfs!

Accordingly, the maximization problem faced by the master is that of Model A with the addition of one more constraint:

(6) $\max Y_m = F(L_m, T_m)$

subject to

(7) $T_m + ST_s = T,$

(8) $L_m + SL_s = HS,$

(9) $Y_s = F(L_s, T_s) > E,$

and

(10) $Z = \frac{T_s}{H - L_s} > Z^*,$

where $Z^*$ is the legal minimum of $Z$.

Depending on the number of serfs on the estate, the operation of Model C can be divided into three periods:
1. When the number of serfs is small (for a given $T$), the constraint (10) is not binding, as the master would voluntarily set (the implicit) $Z$ above the legal minimum of $Z^\ast$. Hence the Inventories are not yet effective and we are in a situation similar to Model A.

2. As the number of serfs increases, the $Z$ set by the master declines to the legal minimum and remains there. By solving equations (6), (7), (8), and (10) he determines the magnitudes of $L_m$ and $T_m$ which are optimal for him. But the number of serfs may still be insufficient to furnish him with the required $L_m$ without depriving the serfs of time needed for their own work, as required by equation (9). To satisfy the latter, the master must forgo the maximization of his own income (equation (6)). Instead, he endows each serf with $L_s$ and $T_s$ as given by equations (9) and (10) and retains the remaining labor time for his own use. So far, the inventories have not raised the serfs' incomes above subsistence.

3. With a still larger number of serfs, the master becomes able to obtain the $L_m$ optimal for him while retaining the proper $T_m$. Now he has enough serfs, but, so long as equation (9) is satisfied, he does not object to an increase. His own maximum income having been assured, he simply allots each serf a larger $L_s$ and a smaller $T_s$. It is at this stage that the serfs' income may rise above subsistence. It may even reach a maximum for a certain magnitude $S$.

If the production function in this problem is specified the results can be expressed more concretely. Figure 3 presents them for a Cobb-Douglas function $Y = L^\alpha T^\beta$. The solid curve indicates $Y_m$ the the absence of Inventories (or Paul's Law) as in Model A. The dotted curves indicate the
Figure 3
THE MASTER’S INCOME
IN MODELS \( A \) AND \( C \)
corresponding $Y_m$'s for several magnitudes of $Z^*_m$, as shown by the subscripts. To the left of points A, the Inventories are ineffective; to the right of points B the master needs no more serfs.28

The effects of the Inventories on the master's income and on the prices of land and of serfs are fairly obvious. As was the case in Model B, his income is reduced because the Inventories make serfdom inefficient, but contrary to Model B, the effectiveness of the Inventories becomes stronger with increasing serf population. The marginal product of the master's land rises (it fell in Model B) because each serf receives more land than he did in Model A. It may pay the master to buy or to rent more land (even from his own serfs). The marginal product of labor per serf -- the slopes of the dotted curves -- are of course lower than they would have been without the Inventories, and to the right of points B, the net marginal product of labor on the master's land is zero and so should be the serf's price. And yet the master, while not requiring more serfs, may refuse to free a number of his own so long as the $Z$ in the free sector is above that legislated for serf estates (and equation (9) is satisfied). This curious situation (mentioned at the end of Model A) may continue until the $Z$ in the free sector is brought down by population growth (in the absence of technological progress and of capital accumulation) to the level set for serf estates. Of course, serfdom can be ended much sooner (and even without a formal emancipation) by raising the $Z^*$ in the serf sector to the level of the free.

MODEL D -- SERFS ON OBROK

Obrok (or quitrent, as Gerschenkron calls it) was the payment made by the serfs to the master, usually in money, in lieu of labor services.29 On some estates all serfs were on obrok; on others, and even in some house-
holds, _obrok_ and labor services were mixed. As a result, the statistical data on the number and distribution of _obrok_ serfs are inexact.

According to data submitted by the masters on the eve of the Emancipation, the frequency of this system had a distinctly regional character. The highest percentage of serfs on _obrok_ was in the Central Industrial Region -- 58.5, and in the Lake Region -- 47.0. Next came the Central Agricultural and Volga regions with 23.7 and 23 per cent respectively. All these areas were in Great Russia; outside of it, the _obrok_ system was almost nonexistent.  

The high fraction of _obrok_ serfs in the Central Industrial and Lake regions has a simple explanation: 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 non-agricultural pursuits. By imposing an _obrok_ in lieu of relatively unprofitable agricultural labor services the masters were able to tap the serfs' non-agricultural earnings. But why was this system not used more widely? Even in the Central Industrial Region, some 40 per cent of serfs rendered labor services; in the Lake Region -- more than one-half. Nor is there clear evidence that the _obrok_ system was expanding over time.

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

Obviously, many masters must have had good reasons for preferring labor services to obrok. Here are a few possibilities:

1. Economies of scale. These were probably unimportant because little machinery was used and the serfs usually came to work with their own animals and implements.

2. Superior management, particularly on large estates run by professionals (often Germans). And yet, large estates (over 100 souls) chose labor services less often than small ones.32

3. Unwillingness by serfs to accept the risk (of poor harvests or of low prices) inherent in the obrok system. But why should this risk aversion have such a regional pattern? Besides, extensions and reductions in payments were usually obtained.

4. Historical reasons, that is inertia, which made changes difficult. This type of explanation is usually suggested in the absence of more convincing ones.

5. The most important problem with the obrok system was probably the difficulty of collection. No serf could fall far behind in rendering labor services. But 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 even of professional managers on their inability to collect the arrears, these were of limited effectiveness.33 Perhaps in the industrialized areas serfs had steadier incomes from diversified sources; they were also 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 non-paying tenant could be easily evicted.

Did Paul's Law and the Inventories encourage the shift to the obrok system? So it would seem 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 obrok was rather uncommon. The Inventories should have been effective in well-settled areas, like the South-west, and yet labor services completely dominated there. Perhaps the Inventories had been introduced too recently 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 accelerate the end of serfdom? Soviet 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 had in the Russian context), the beginning of capitalism, and the general crisis of serfdom.\(^3\)

Now, it is quite possible that in Western Europe the replacement of labor services by money payments did have such an effect: once these (nominal) payments had been fixed by contract, custom or law they became highly vulnerable to subsequent inflations (such as took place in the XVI-XVII centuries). Even if originally set above market rents (otherwise serfdom would have been unnecessary), their real value was whittled down to or below the market level, and made serfdom unprofitable for the masters. The growth of population would have had a similar effect.

But in Russia the obrok levels were not fixed by contract, custom or law. They were set by the masters and, as shown by Blum, they did not fail
to keep pace with inflation. Far from destroying serfdom, the obrok system was likely to make it more flexible and long-lived.

The obrok system facilitated the entrance of serfs into non-agricultural pursuits. A serf so engaged needed less land or none at all; hence he 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 land — the main economic cause of the possible end to serfdom in a country like Russia. There was no limit on the number of non-agricultural serfs a master would 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 he had a dual relationship with his master: as a serf he had to pay the obrok; thereafter, like a free man, he could take a job on his master's estate or rent his master's land. This remarkable combination of serfdom with freedom allowed him to work as effectively as any free man (if it is true that free men work more effectively than serfs), and yet satisfy his master. True enough, for the serf it was not an ideal relationship.

Besides paying the obrok set by the master and getting nothing in return, he was subject to his master's whim: his passport could be revoked, forcing him back to the estate; he had to hide his wealth lest his obrok might be raised; and his property bought in the master's name could be seized by the latter.

But from the master's point of view, this 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 they had not the slightest reason for renouncing serfdom.
Solution of Model A with a Cobb-Douglas production function. With the function

\[ F(L,T) = L^\alpha T^\beta \]

the solution to the maximization problem of equations (1) through (4) takes the form

\[ T^* = E\left(\frac{T}{HS}\right)^\alpha, \]
\[ L^* = E\left(\frac{HS}{T}\right)^\beta, \]
\[ T^*_m = T - ES\left(\frac{T}{HS}\right)^\alpha, \text{ and} \]
\[ L^*_m = SH - ES\left(\frac{HS}{T}\right)^\beta. \]

The level of \( S \) which maximizes \( Y \) in the long run (given \( T \)) is given by

\[ S = \left(\frac{\alpha}{E}\right)^{\frac{1}{\alpha}} T. \]

It is assumed that \( S \) never exceeds this magnitude. At the long run maximum

\[ T^*_m = \beta T, \] and
\[ L^*_m = \beta HS. \]

Derivation of Table 1. From equations (4) (with strict equality) and (5) it follows immediately that

\[ \eta_{F,L,S} \cdot \eta_{L,S} S + \eta_{F,T,S} \cdot \eta_{T,S} S = 0 \quad \text{and} \]
\[ \eta_{L,S} S - \eta_{T,S} S = 1, \]

where \( \eta_{a,b} \) denotes the elasticity of variable \( a \) with respect to variable \( b \). Solving yields

\[ \eta_{L,S} S = \eta_{F,T,S} > 0 \quad \text{(so} \quad \frac{dL_S}{dS} > 0) \quad \text{and} \]
\[ \eta_{T,S} S = -\eta_{F,L,S} < 0 \quad \text{(so} \quad \frac{dT_S}{dS} < 0). \]
Since \( \eta_{T,s}^T \), \( s = -\eta_{F,L_s}^T > -1 \), we have \( \frac{d(S \cdot T_s)}{dS} > 0 \) so from equation (2) we get

\[
\frac{dT_m}{dS} < 0.
\]

(13a)

Finally, since an increase in \( S \) will raise the master's income provided the marginal product of labor is above subsistence, we have from (13a) and (1) that

\[
\frac{dL_m}{dS} > 0.
\]

(14a)

### TO MODEL C

Proof that \( \frac{dZ}{dS} < 0 \) in Model A. Since the land/labor ratios on serf's and master's parts of the estate are equalized in Model A (equation (5)), the assumption that the marginal product of a week's labor is greater than the weekly subsistence requirement implies

\[
\frac{\partial F \cdot H}{\partial L_s} > E = F(L_s, T_s) = \frac{\partial F}{\partial L_s} \cdot L_s + \frac{\partial F}{\partial T_s} \cdot T_s
\]

which implies

(15a)

\[
0 > -(H-L_s) \cdot \frac{\partial F}{\partial L_s} + T_s \cdot \frac{\partial F}{\partial T_s} = \text{from (11a) and (11b)}
\]

\[
\frac{S \cdot F(L_s, T_s)}{T_s \cdot L_s} \cdot \left[ (H-L_s) \cdot \frac{dT_s}{dS} + T_s \cdot \frac{dL_s}{dS} \right] = \frac{S \cdot F(L_s, T_s)}{T_s \cdot L_s} \cdot \left[ (H-L_s)^2 \cdot \frac{dZ}{dS} \right].
\]
III. EMPIRICAL TESTS

The direct empirical evidence presented by Pokrovskii in support of his assertion that serfdom had become unprofitable for the masters was extremely weak. It consisted of a few examples showing the superior profitability of free labor, collected by a liberal government official in 1841, and of quotations from several "progressive" serfowners. None of them had made a statistical study.37

His reasoning was more interesting: serfdom had become unprofitable because of a large rise in grain prices in the 1840's. This provided an incentive for the serfowners to transform their estates into capitalist enterprises to be operated by the more efficient free labor. To obtain the needed capital, they wanted the government to redeem the serfs.38 (That such a redemption was in fact carried out after 1861 should not affect our evaluation of Pokrovskii's argument.)

An increase in grain prices should raise the profitability of all agriculture, serf and free. But the money wage in the free sector is likely to lag, as wages usually do, behind the rise in prices. The resulting fall
in the real wage may reduce the relative attractiveness of serf labor. Even when the new equilibrium is reached, it is quite possible that the new ratio of land rent to wages will be higher than before. Since serfs are implicitly paid in rent while free workers receive wages, the ratio of the cost of the serf to that of a free worker will rise. But whether this ratio changed sufficiently to induce the masters to part with serfdom would depend, among other things, on two factors: on the magnitude of the price rise and on the ability of the masters, whose serfs became better off, to push them back to subsistence by reducing their time and/or land allotments.

The second factor was not likely to be of great importance because serfs marketed only a small fraction of their own output; hence the rise in grain prices would not improve their position greatly; moreover, in areas of poor soil and climate, such as in the Central Industrial and the Lake regions, where some serfs had to buy grain for their own subsistence, the adjustment might even go in the other direction.

But the behavior of grain prices, as cited by Pokrovskii, did not support his contentions. True enough, in Berlin, according to him, a substantial increase took place during the period 1831-40 to 1851-60, but in Odessa -- more relevant to his argument -- prices of wheat and rye rose sharply in 1847 and fell back by 1850 below their original level of 1846. During the Crimean War they fell even more. On the other hand, a more serious study made by two Soviet historians indicated a considerable rise in prices of rye and oats in most provinces during the 1846-55 (or 1847-56) period. So Pokrovskii must have weakened his own case by the use of wrong price data, but whether the actual rise in prices was sufficient to support his thesis remains an open question.
A more direct approach to the problem was taken by P. Maslov early in this century and by Blum in 1961.\textsuperscript{41} Blum's attempt is discussed below.

The ideal set of data required for these studies (including our own) would consist of time series of serf prices by provinces or by regions for several decades preceding the Emancipation. A persistent and widespread fall in these prices could be accepted, in our opinion, as a fair proof that serfdom was nearing its end.\textsuperscript{42} To the best of our knowledge, such series does not exist. Even a most patient mole would be challenged to construct it from scattered bits and pieces. 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 collection, which has been used, even if often indirectly, by historians of our and of related subjects, consists of aggregate land sales reports covering the 1854-58 (inclusive) period as a whole published by the Land Department of the Ministry of the Interior in 1859.\textsuperscript{43} The data are arranged by provinces (губернии) and by counties (уезды) and divided into sales of populated land (with serfs) and of unpopulated land. For each county, the number of sales, the total values of the transactions, the number of desiatins (one desiatina = 1.09 hectare), and for populated land -- the total number of serfs sold -- are given. Finally, official prices per desiatina and per serf are also supplied.\textsuperscript{44}

We are told in the Introduction that the original data had been edited to eliminate extreme and unusual cases.\textsuperscript{45} We are warned that the values of many transactions might have been under-reported to reduce transfer duties but that prices of patrimonies might have been overstated to protect buyers from possible redemptions.\textsuperscript{46} On the whole, 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 (see Table 3 below) were stated to be "... almost everywhere below actual prices."\(^{47}\) If so, official prices could indicate the minimums of actual prices and thus provide a useful check on Blum's and our estimates. Indeed, with only one exception, the statement held true for prices of unpopulated land, and usually with a large margin. But when applied to prices of populated (serf) estates, it was wrong (that is, the sums of the values of land and of serfs based on official prices exceeded the reported values of the estates) in 18 out of 42 provinces. If the sales reports had a downward bias, as indicated in the Introduction, why were the prices of serf estates particularly affected? Were these transactions, because of their greater complexity, easier to under-report? Or had the prices of serf estates suffered a large recent decline not yet reflected in official prices? We will return to this question below.

Comparing these sales data with statistics on serf estates collected by the Government on the eve of the Emancipation, we find that, with some regional variations, the sales reports covered 3.6 per cent of all land on serf estates in the country and 3.7 per cent of all serfs, or some .7 per cent per year -- not a large sample.\(^{48}\) But the near equality of these two percentages suggests that the land/serf ratios in the sales reports must have been reasonably close to those of all estates. On the other hand, the average number of serfs and of desiatins per sale constituted only some 80 per cent of the corresponding magnitudes of all estates. Either large estates were sold infrequently or they were excluded by the editor as unusual cases. Since large estates usually commanded a lower price per unit than others, this exclusion should lend an upward bias to the values in the sales data.
Several historians interested in prices of serfs or in the prices of land allotted to former serfs by the Emancipation, calculated these prices by assuming the equality of prices of populated and of unpopulated land (in a given area), presumably because the latter prices could be so easily obtained.\(^49\) They disregarded a specific warning against this assumption recorded in the discussions of some provincial committees prior to the Emancipation, because unpopulated land was bought in small quantities, usually as increments to estates.\(^50\) Indeed, the average sale of unpopulated land was only some 12 per cent of the size of populated sale. In some regions, like Lithuania, White Russia and Little Russia, these percentages were even lower: 4.4, 2.7, and 5.3 respectively. For the whole country, the quantity of unpopulated land sold constituted some 24 per cent of the sales of all land on serf estates, but in White Russia it was only 8.6 per cent and in the South-west -- a tiny 2.8 per cent.

Even if these two prices of land were equal for each province, there would still remain (at least) two methods of calculating the serf price for a given region: In the first, the single weighted-average land price for the whole region would be calculated first and then applied to the total value of the estates; in the second, serf prices would be obtained for each province separately, and then averaged for the whole region. (The second method could start from the county level, but we abstained from this ambitious task.) The second method, which appears to us to make a bit more sense, is likely to yield lower serf prices than the first, and this is confirmed by a comparison of figures in Cols. 1 and 2 in Table 3.\(^51\) Blum must have used the first method; his prices are so close to those in Col. 1 that we are not reproducing them here.
The same as in Col. 3.
Col. 10: From Table 5-2 in the Statistical Appendix. The deflation method is described there. Aggregation weights are the same as in Col. 3.
Col. 9: Values of the estimates taken from "Swedenita" (p. 4).
Col. 8: Official retail prices from "Swedenita" (p. 4). Aggregation weights are the same as in Col. 3.
Col. 7: Official retail prices from "Swedenita" (p. 4). Adjustment makes to pay the master 2/3 as much as dock rates. Aggregation weights are the same as in Col. 3.
Col. 6: Observe data taken from Skerstakki, Kesttandata (p. 4). Price V0.3, pp. 1239-30. Observe per quart capitalized at 8 per cent. Non-derog. sets are assumed to pay the master 2/3 as much as dock rates. Aggregation weights are the same as in Col. 3.

Sources and methods:

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<thead>
<tr>
<th>Source</th>
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<tr>
<td>Data</td>
<td>Price of services, taken from tables in &quot;Swedenita&quot;</td>
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Table 3

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<tr>
<th>Major Regions</th>
<th>(1) By First Method (2) By Second Method</th>
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<td>Actual Region</td>
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Table 3

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The hypothesis that prices of populated and of unpopulated land (in a given area) were equal was subjected to a statistical test; the results were negative (see the Statistical Appendix). It turned out that populated land was much cheaper than unpopulated, much to our own surprise because we had expected populated land to be of higher quality and/or better location. More about land prices will be said below.

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

\[ V_p = C + P_S S + P_T T \]

where _V_p_ is the sales value of the estate, _S_ the number of serfs on the estate, and _T_ is the amount of land on the estate, so that the coefficients _P_S_ and _P_T_ would give the price of serfs and the price of land respectively (\( C \) is a constant term) (see Statistical Appendix for details). The results are presented in Col. 3 of Table 3. In the central Agricultural, Lake, Lithuania, Little Russia, Southwest, New Russia and Viatka-Perm' regions the regional serf prices were estimated directly by the regression. In the other regions, that is, in the Central Industrial, White Russia, and the Volga, the hypothesis of a uniform serf price over the region was rejected, and the prices in Col. 3 are weighted averages of the provincial serf prices estimated by the regression.

With the exception of Lithuania (see below) and the unimportant Viatka-Perm' region, the direct estimates of the regional serf prices presented in Col. 3 of Table 3 are statistically significant (at the ninety-five percent confidence level), but a more detailed examination of our estimates given in Table S-1 in the Statistical Appendix reveals a number of troubles. In three provinces (Moscow, Saratov, and Orenburg) the estimates of the serf price are negative, though not significantly so. In the Central Industrial and Lake regions, the spread of serf prices among the component provinces looks suspicious. Finally, in seven provinces and in one whole region (White Russia), the estimates
of land prices are negative -- a nonsensical outcome -- though none of them significantly so. The generally low significance and high standard errors of the estimates reflected by the above aberrations is presumably due to the high degree of correlation between the number of serfs and the quantity of land (80 percent), and by the heterogeneous nature of land quality. 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 populated estates might also have contributed to the above results. On the other hand, two other causes might have depressed the prices of populated estates below their normal capitalized values and thus resulted in lower prices of both land and of serfs:

1. The second half of our period (1854-58 inclusive) took place after Alexander II's famous statement of March 30th, 1856, announcing that the end of serfdom was in sight. Since the conditions of the forthcoming 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 of serfs. In many areas, as noted above, the actual prices of land and of serfs were found, rather surprisingly, to be below official prices.

2. Perhaps the most important reason for the low prices of serf estates was the legal restriction of their purchase and ownership to the members of the nobility. And the nobility was notoriously short of funds.54

Unfortunately, we do not know the net effect of all these factors on our estimates of serf prices. Their reliability must be very modest, at best. For this reason we also listed in Table 3 the results of several other calculations, including one based on official serf prices (Col. 5). Columns 6 - 9 give the relative values of serfs as percentages of the total values of the estates to help the readers, with their own knowledge of Russian history, to make their own choices.
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 in the Black-soil areas -- the opposite held true. If so, our estimates of serf prices (Col. 3) look reasonable in the first three regions, completely wrong in White Russia, not unreasonable in Little Russia, overstated in the South-west, and possibly understated in New Russia and in the Volga regions (though male serfs in the last two regions constituted only 24 and 27 per cent 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 serf (and/or of all agricultural) population and thus to be able to predict the population density which would eventually reduce them 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 (though 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 on soil and climate and, particularly, on the presence of non-agricultural pursuits, such as existed in the Central Industrial and Lake regions.55

We did try another experiment -- the deflation of serf prices by the prices of grain. (See Table S-2 in the Statistical Appendix.) The regional results are given in Col. 10 of Table 3. If our grain prices were less crude, and the estimates -- more reliable in general, the results of this deflation would be of considerable interest. We will treat them now as if they were
The relationship between the nominal prices of serfs and the prices of grain.
reliable, but with a clear warning that they, and the conclusions based on them, may be all wrong. Fig. 4 may help the reader to obtain a quick grasp of the relationship between nominal serf prices and the prices of grain.

The deflation greatly reduced the variation of regional real serf prices. The coefficient of variation fell from 32 per cent (for nominal prices) to 23 (for real prices). Without Lithuania (see below), this coefficient fell from 29 to 15 per cent -- almost by a half. The ratio of the highest regional real prices (in the Southwest) to the lowest (New Russia) became only about two, and the serf price in the South-west, as observed above, was probably overstated, while that in New Russia -- understated.

These results lead to two conclusions: the first is obvious -- grain prices must have accounted for a large, probably the largest, part of the regional variation of nominal serf prices. The second is more interesting. Since in Russia, the masters rather than the serfs decided where the latter would live and work, an active inter-regional serf market would have moved serfs to areas of high nominal serf prices and thus would have brought about greater regional equality of nominal rather than of real serf prices. This did not happen; hence, the regional mobility of serfs must have been insufficient to lead to their optimal geographic distribution from the masters' point of view. On the other hand, a high mobility of free workers would have produced a smaller geographical variation of real than of nominal wages -- a pattern which we found in the regional distribution of serf prices. This would imply a close integration of the serf sector in the general economy; closer than our theoretical discussion (in Part II) assumed. Of course, it is quite possible that the regional distribution of Russian nominal and real wages, while showing the general pattern suggested
above, might have been completely different from the structure of serf prices. This important question should certainly be investigated, but not in this paper.\textsuperscript{57}

Now a word about Lithuania. It is clearly a special case. Its nominal price of serfs was 1.8 standard deviations from the mean of all regions; its real price -- 3.3 standard deviations away. If the mean of real prices was calculated without Lithuania, the Lithuanian real price would be five standard deviations from the mean. In all calculations of regional serf prices presented in Table 3, except for those based on official prices, Lithuania was always at, or close to, the bottom, and by substantial margins. All this may indicate that Lithuanian masters were close to giving up serfdom. Our sources suggest that they were frightened by the forthcoming introduction of the Inventories. It would be most gratifying to find in their fright the confirmation of our Model \textsubscript{C}; unfortunately, the masters in the South-west, on whom Inventories had already been imposed, were evidently thriving under them; at least the serf prices in that region were among the highest in the land.\textsuperscript{58}

Except for Lithuania, we found no other region where serfdom was coming to an end. (It is true 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.)\textsuperscript{59} This assertion would carry more weight if it were deduced from the behavior of time series; but this we do not have.

If the behavior of the serf prices before the Emancipation does not indicate, on the whole, 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 (though with a considerable regional variation).\textsuperscript{60}

But, as was explained by Troinin\'tskii in 1861 and more thoroughly by Hoch and Augustine in 1979, this 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.\textsuperscript{61}

It is also true that the total debt of serfowners to several governmental institutions had reached by 1859 what Blum calls "an unbelievable amount" of 425.5 million rubles, involving the mortgage of 42.8 per cent of all serf estates and of 66.5 per cent of all (male) serfs.\textsuperscript{62}

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 between 3.59 and 3.71 per cent of the total value of all serf estates in the country.\textsuperscript{63} Dividing 76.3 million by 3.65 per cent (the mean of 3.59 and 3.71), we obtain 2,091 million rubles as the value of all serf estates. Of this amount, the mortgage debt of 425.5 million constituted only 20.3 per cent. But Blum also mentions private debt; its total amount was unknown; in the Voronezh province it was estimated at almost 17 per cent of the total debt. With this adjustment, the total debt of the serf-owners reached 24.5 per cent of the value of their estates. Finally, our source mentions another 5.5 million of a special debt to the government not included in the above figures.\textsuperscript{64} This adds an extra 2.6 per cent, bringing the total burden to some 27 per cent of the value of the estates. This is a very rough estimate, merely giving an order of magnitude. It is probably exaggerated because the values of estates, as reported in the sales data, were understated. It does not suggest a light burden, particularly for debtors not known for their
efficiency and business sense, but it does not appear unbearable either, and it is certainly less alarming that the oft-quoted phrase that two-thirds of all serfs had been mortgaged.65

In any case, the fact that Russian serfowners lived beyond their means -- a common trait among 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 the debt and the lowest percentage of serfs mortgaged.66

IV. CONCLUDING REMARKS

We did not find that the profitability of Russian serfdom before 1861 was threatened by the growth of serf population, Paul's Law, the obrok system or by the masters' debts. The Inventories could have inflicted a severe damage, and they seem to have done (or threatened to do) so in Lithuania, but not in the South-west and in White Russia.

Our empirical tests were severely handicapped by the quality of our data and most of all -- by the absence of time series. For this reason, we could not test Pokrovskii's contention that the profitability of serfdom was being undermined by rising grain prices, though the positive correlation found by us between regional prices of serfs and of grain makes us feel skeptical about it.
This paper is essentially a research report. We are offering it to the profession now in the hope that our numerous mistakes will attract the attention of other scholars willing to correct them and to continue the work, for we have barely scratched the surface. For an analytically-minded economic historian (or for an economist doubling as such), Russian economic, and particularly agrarian, history is a thinly populated land: pre-revolutionary Russian scholars lacked the training, and Soviet scholars, even those who possess it, are impeded by the official ideology, while the number of Western researchers has been small. We are ready to share our little pile of historical materials with other explorers to come.
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. Specifically, we have for each county: the total value of all populated estates sold during the time period \( V_p \); the total number of "souls" (adult 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 desiatins.  

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

\[
V_p = P_S \cdot S + P_T \cdot T_p \\
V_u = P_T \cdot T_u
\]

for each observation (i.e. county) in the market. If these valuation equations are correct, and if in addition \( P_T \) takes on the same value in each equation (i.e. if the prices of populated and unpopulated land were the same), then the most efficient means of estimating \( P_S \) and \( P_T \) in each market would be to stack (i.e. combine) equations (1s) and (2s) and run them over all counties in the market. To test the assumption of a common \( P_T \) value in both equations, we ran the equation

\[
V_p - V_u = C + P_S \cdot S + P_T \cdot (T_p - T_u) + Q \cdot T_u
\]

over the whole country, allowing the coefficients \( P_S \), \( P_T \), and \( Q \) to vary by province. If the prices of populated and unpopulated land were the same in each county, we would expect estimates of \( Q \) near zero. However, a test of the hypothesis that all the \( Q \) coefficients were zero yielded rejection at the 5% (and indeed, 1%) level, with 33 of the 42 provinces having negative \( Q \) coefficients (8 of these significant at the 5% level) and only 9 provinces having positive values (with 1 significant at the 5% level). 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 (1s) and (2s), or alternatively the method used by Blum[1961] (see text) would in general lead to downward biased estimates of serf prices. In light of this, we decided not to 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 (1s) (equation (11) in the text) requires both a determination of the size of the "market" in which each county is located, as well as testing for any possible heteroscedasticity. To check for heteroscedasticity, equation (1s) (with the addition of a constant term) was run over the whole country, allowing the coefficients $\beta_S$ and $\beta_T$ to vary by province. On the assumption that the market areas were at least the size of a province, this regression would yield consistent estimates of the coefficients, and hence consistent estimates $\hat{\alpha}$ of the error term in each county. We then ran the equation

\[(4s) \quad \hat{\alpha}^2 = C + \nu \cdot S + \lambda \cdot T_p \]

over the entire country, with results

\[(5s) \quad \hat{\alpha}^2 = 9.39 \cdot 10^7 + 9.77 \cdot 10^5 \cdot S + 4816 \cdot T_p \quad \text{error.} \]

\[ (1.83 \cdot 10^8) \quad (1.91 \cdot 10^5) \quad (22323) \]

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

To determine the appropriate market sizes for serfs and land, we tested the hypotheses that serf and/or land prices were equal for all provinces in each of the ten regions of the country (see text). Thus, for each region, we began by running equation (1s) (with the addition of a constant term), allowing land prices to vary by province, and tested the hypothesis that the coefficients $\beta_S$ were equal
for all the provinces within the region. We then tested the hypothesis that the land prices (i.e. coefficients \( p_T \)) 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. Table S-1 contains our estimates of serf and land prices for each province, with the appropriate market size determined by the above tests.

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

Notes

1. Besides listing the above values for each county, the report also gives the provincial sums for each of these five series, as well as listing various ratios of these series for each county (\( T/S, V/S, V/T \), and \( V/T \)). While these additional listings are strictly speaking redundant, they provided a means of cross checking the original series for typographical errors. Such a check revealed about a dozen clearly identifiable typos, i.e. 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, the sums, and the ratios which could not be so easily corrected. Since these calculations were in all likelihood performed on abaci, whenever there was any discrepancy, we adjusted (or didn't 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 populated estate ratios were correct provided a further justification of this procedure. Further details of these corrections, as well as a list of the (corrected and/or uncorrected) data may be obtained from the authors.

2. Note that not all counties reported sales of both populated and unpopulated estates.

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

4. The above estimation and test were performed using the heteroscedasticity correction described below.

5. That the variance of the error term is highly correlated with \( S \) might be expected, since the sales value of the estate would presumably depend upon the entire serf population, while the variable \( S \) only includes adult males ("souls").

6. All tests were at the 5% 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 (see Tables S-1 and S-2).
### Table S-2

**REAL PRICES OF SERFS AND OF POPULATED LAND**

**OBTAINED BY REGRESSION**

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<th>Serf price</th>
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Sources: "Svedeniiia" ["Data"]: The deflator consisted of a weighted average of prices of rye, oats and wheat only. The prices of rye (for 1846-55) and of oats (for 1847-56) 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 1846-56. 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 1870-74 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.
NOTES

*Thanks are expressed to Ms. Anna Bobrov and Dr. Homi Kharas for their valuable assistance in the early stages of our work; to Professors Martin L. Weitzman, Darryl McLeod and Vladimir Shlapentokh and to Mr. Ian Ayres (a graduate student at M.I.T.) for their helpful comments; to Professor Stephen M. Goldfeld for his elucidation of certain econometric methods; to students in several economic history classes at M.I.T. for their patient (even if involuntary) attention, and particularly to Mr. William R. Easterly (also a graduate student at M.I.T.) for his discovery of a serious error in an earlier version of Model C. For the remaining mistakes (of which there must be a goodly number) we alone are responsible.

We are also grateful to the National Science Foundation for financial support (Grant No. SES-7709307).


The general crisis of serfdom is a well-accepted Marxist doctrine. See, for instance, P. I. Liashchenko, Istoriia narodnogo khoziaistva SSSR [History of Peoples Economy of the USSR] (Moscow, 1956), pp. 467-510; I. D. Koval'chenko, Russkoe krest'ianstvo v pervoi polovine XIX veka [Russian Serf Peasantry in the First Half of the XIX Century] (Moscow,
1967), particularly pp. 378-85; P. Maslov, Agrarnyi vopros v Rossii [The Agrarian Problem in Russia], 4th Edition, Vol. 1, (St. Petersburg, 1908), pp. 389-91; V. A. Fedorov, Pomeshchich'i krest'iane tsentral'no-promysshlennogo raiona Rossii kontsa XVIII - pervoi poloviny XIX veka [Landowners' Peasants of the Central Industrial Region of Russia, End of the XVIII - First Half of the XIX Centuries] (Moscow, 1974), pp. 256-57, and others including 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. It was shared by the other Marxists cited here. See also Blum, Lord, pp. 563-64.


3Blum, Lord.

4The assumption that serfs did not work better on their own land might appear strange. But data collected by Koval'chenko, Russkoe [Russian] p. 57, for six provinces in 1842-60 shows practically equal harvest-to-seed ratios on both parts of the estates. Perhaps the masters appropriated better or more accessible land. Tolstoi's description of Nikolai Rostov's (a model landowner) supervision of his serfs' work on both parts of his estate does not suggest particular ardor on the serfs' part when working for themselves. (War and Peace, translated by Leo Wiener (New York, 1968), Vol. 4, pp. 370-374.)

If the serfs had really worked much better on their own land it would have paid their masters to use the obrok system more frequently than they did. See Model D.
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 and forest.

5 That the serfs worked much harder in summer than in winter is disregarded.

6 Actually, as Blum describes (Lord, pp. 469-74) there was considerable wealth and income differentiation among the serfs.

7 The maximization of incomes by the masters probably implies a greater rationality than actually existed. From all accounts it is clear that Russian serf-owners were much less efficient than American slave-owners.

8 In Model C the inequality plays an important role.

9 Since the total cost of serfs (SE), for a given S, to the master is given, the maximization of \( Y_m \) is equivalent to the maximization of \( Y \), which calls for the equalization of the marginal products of labor and of land, respectively, on both parts of the estate. With identical homogeneous first degree production functions, the latter condition is obtained by equalizing the land/labor ratios -- an intuitively obvious result.

Some mathematical derivations in this Model could be simplified by assuming that the master runs his estate as a unit and hires his serfs at a wage equal to \( E \).

10 The Mathematical Appendix also derives the interesting result that the elasticities of \( L_s \) and \( T_s \) with respect to \( S \) are equal in absolute value to the elasticities of output with respect to land and labor respectively.

Actually, the results of Table 1 can be obtained without formal mathematics. Let the number of serfs on a given estate increase by one percent. If all land for the new arrival is taken from other serfs, \( T_s \) will
decline by (approximately) one per cent and $L_s$ will have to be increased accordingly to maintain the serfs' subsistence. The labor/land ratio on the serf land will then increase by more than one per cent, while on the master's land -- by less than one per cent, thus violating the efficiency condition (5). To restore it, the master will have to contribute some of his own land to the new serf's allotment.

Similar reasoning can show that the other extreme -- not taking any land from the other serfs -- will not be efficient either.

The Cobb-Douglas production function undoubtedly exaggerates the elasticity of substitution between land and labor in Russian agriculture. In that function, the marginal productivity of land approaches zero only when its quantity approaches infinity. But in reality, even when free land was available, a peasant would not take more than he could use. Increasing distance from his homestead would rapidly diminish its usefulness.  

11 Jerome Blum, The End of the Old Order in Rural Europe (Princeton, 1978), pp. 50-59. There were many local variations, however.

12 See Koval'chenko, Russkoe [Russian], pp. 263-81; Fedorov, Pomeschchich'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 XVIII century reported by these authors did not induce them to deepen their investigations.

13 On the other hand, there is evidence that in the XVIII century labor services demanded from serfs were very heavy indeed. According to Kliuchevskii, General Peter Panin, having described the intensive exploitation of serfs to Catherine II, suggested to her that their labor
obligations should be limited to four days a week. See V. Kliuchevskii, Kurs russkoi istorii [A Study of Russian History], (Moscow, 1937), Vol. 5, pp. 128-29. Other examples are given on pp. 146-47.

Aleksandr Skrebetskii, Krest'ianskoe delo v tsarstvovanii Aleksandra II: materialy dlia istorii osvobozhdeniia krest'ian [Peasant Affairs During the Reign of Alexander II: Materials on the History of the Emancipation of the Peasants](Bonn, 1865/6), Vol. 2, Part 2, pp. 1491-1551; Vol. 3, pp. 1227-1293. Actually, additional payments in kind were often required.

Ibid.

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 Domar, "The Causes", p. 22.

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. There may also be cases when the unfree worker (slave or serf) may be more reliable or available than a free worker.

Blum, Lord, pp. 445-47.

But, according to Semevskii, Emperor Paul extended serfdom to several new provinces and raised labor obligations from two to three days a week in Little Russia. See his Krest'ianskii vopros v Rossii v XVIII i pervoi polovine XIX veka [The Peasant Question in Russia in the XVIII and in the First Half of the XIX Centuries] (St. Petersburg, 1888), pp. XIV-XV.

A. Troinitskii, Krepostnoe naselenie v Rossii po 10-i narodnoi perepisi [The Serf Population of Russia According to the 10th Population Census] (St. Petersburg, 1861), pp. 54-55; S. L. Hoch and W. R. Augustine,

21 See sources cited in note 12.

22 The law was decreed in 1814 and 1827. (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 on the whole estate. Skrebitskii (*Krest'ianskoe* [Peasant], Vol. 2, Part 2, pp. 1491-1539), cites very many cases when the serf land allotment was less than 4.5 desiatins 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.

23 In such cases the income of the serfs might rise above subsistence.


25 According to Blum (*Lord*, pp. 460-62), the Inventories were definitely imposed on the three South-western provinces (Kiev, Volyniia and Podoliia) in 1848. But in Lithuania and White Russia they were postponed because of the opposition of the serf-owners. On the other hand, 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).
26 This is a great simplification. Actually, serf duties, some with and some without horse teams, were quite complex.

27 The maximization of \( Y_m = \frac{L}{m} \alpha T \beta \), subject to \( Z = \frac{T_s}{H - L_s} = \frac{T - T_m}{L_m} \),
gives \( T_m = \beta T \) and \( L_m = \frac{\alpha T}{Z} \), both expressions being independent of \( S \). The \( S \) maximizing \( Y_s \) (at the maximum \( Y_m \)) equals \( \frac{\alpha T}{\beta H Z} \). Note that both \( Y_m \) and \( S \) are inversely related to \( Z \).

28 The Inventories induced the master to allot, or perhaps more correctly -- to impose -- upon his sefs more land and hence demand from them greater labor services than he would in Model A. Since students of serfdom usually emphasize the extent of these services and say little about the size of land allotments (a rather complex subject due to different qualities of land) they may erroneously conclude that Inventories must have worsened the serfs' condition.

29 Gerschenkron, "Agrarian," p. 713. He was wrong, by the way, in claiming that the obrok paid to his master by a serf employed in industry was "a tribute of industry to the serf-owners and as such a trammel upon industrial development" (p. 715), unless the serf was free of similar obligation when living in the village.

31 Koval'chenko, Russkoe [Russian], pp. 62-63; Semevskii, Krest'iane [Peasants], pp. 48-51, 591-92; Blum, Lord, pp. 394-401. There were regional variations between the two periods, but the totals for the whole country remained stable.


34 See sources cited in note 1.

35 Blum, Lord, pp. 449-51; Koval'chenko, Russkoe [Russian] pp. 131, 295-97. The latter claims that in the XIX century the magnitude of obrok (in real terms) was increasing.

36 Indova, Krepostnoe [The Serf], pp. 178-82; Fedorov, Pomeshchich'i [Landowners'], pp. 42-50; Koval'chenko, Russkoe [Russian], p. 151.

37 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. His 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.


38 Pokrovskii, Russkaia [Russian], pp. 55-84.

Pokrovskii, *Russkaia* [Russian], pp. 44-46, 53; I. D. Koval'chenko and L. V. Milov, *Vserossiiskii agrarnyi rynok XVIII – nachalo XX veka* [All-Russian Agricultural Market XVIII – Beginning of XX Century], (Moscow, 1974), pp. 394-97. We still have to find out whether agricultural prices rose relatively to other prices.


See the discussion at the end of Model A.

"Svedeniia o prodazhnykh tsenakh na zemli," ["Data on Selling Prices on Land"], *Zhurnal ministerstva vnutrennikh del* [The Journal of the Ministry of Internal Affairs], 1859, Book 7, pp. 1-46; Book 8, pp. 95-118, to be referred to as "Svedeniia" ["Data"].

Additional details about these data are given in the Statistical Appendix.
The name of the editor is not given, but according to D. I. Rikhter, the editor was A. G. Troinitskii, the well-known statistician. See D. I. Rikhter, "Zabytyi material po statistike prodazhnykh tsen na zemliu" ["Forgotten Materials on the Statistics of Selling Prices on Land"], Trudy Imperatorskogo Vol'nogo Ekonomicheskogo Obshchestva [Works of the Imperial Free Economic Society], 1897, Vol. 2, Book 4, 1-28. We made use of another work by Troinitskii below.

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

"Svedeniia" ["Data"], p. 3.

According to R. W. Fogel and S. L. Engerman, in the period 1830-40, 1.92 per cent of slave population in Maryland was sold each year. They accepted this as the national average. See their Time on the Cross: The Economics of American Negro Slavery (Boston, 1974), Vol. 1, p. 53. But the Russian figure does not include serfs sold without land. Their number was probably not large and restricted to servants, craftsmen and other non-agricultural workers.

Besides Maslov and Blum, mentioned above (note 41), 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 Emancipation.

Skrebitskii, Krest'ianskoe [Peasant], Vol. 3, p. 17.
Indicating the first and second method by superscripts, we can express the serf price for the region obtained by each method as follows:

\[(\text{ln})\]

\[P^1_s = \left(\frac{1}{\Sigma S}\right)\left[\Sigma V_p - \frac{\Sigma P_{T_u} T_u T_p}{\Sigma T_u}\right]\]

\[(\text{2n})\]

\[P^2_s = \left(\frac{1}{\Sigma S}\right)\left[\Sigma V_p - \frac{\Sigma P_{T_u} T_p}{\Sigma T_u}\right],\]

where \(V_P\) is the value of populated estates, \(S\) the number of serfs on these estate, \(T_P\) the amount of land on such estates, \(T_u\) the amount of land on unpopulated estates, and \(P_u\) the price of unpopulated land. It is obvious from (ln) 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, it is the provincial quantities of populated land that are used as weights, a procedure that seems to us to be more justifiable than the first.

From (ln) and (2n) it can be easily deduced that \(P^1_s > P^2_s\) if

\[(3n)\]

\[\frac{\Sigma P_{T_u} T_u}{\Sigma T_u} < \frac{\Sigma P_{T_u} T_p}{\Sigma T_p} .\]

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, The RAND Corporation, (Santa Monica, Calif., 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 quantities of populated land; hence this inequality is likely to be true more often than not.
52 The negative Moscow price is obviously wrong: in the adjacent Vladimir province the serf price is suspiciously high — 211.82 — the highest of all shown on Table S-1 in the Statistical Appendix. Sixty-five per cent of serfs in the Moscow province were on obrok, paying an average annual sum of 10.84 rubles. Capitalized at 8 per cent this would amount to 135.50. Assuming that non-obrok serfs were only 2/3 as profitable as the ones on obrok, we will get 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 percentages of obrok serfs were only 30.8 and 8.6 per cent respectively, such exercise is less meaningful, but, for whatever it is worth, the 2/3 assumption would yield the respective prices of 82 and 84 rubles. Of course, the 8 per cent capitalization and the 2/3 assumption are arbitrary, but it is obvious that any reasonable change in these magnitudes would stop far short from reducing the serf prices in these three provinces to zero. (Sources are given in Table 3.)

The land redemption bonds given to the former serfowners after the Emancipation carried 6 per cent interest. Hence, the 8 per cent capitalization assumed here looks reasonable. While every serf was mortal, he was expected to leave offspring.

53 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 indicating the number of "souls" but not the number of desiatins and other attributes, and that banks should give mortgages in a similar manner. 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 polozhenie gubernii v 1856
godu" [Bank Debts and the Conditions of Provinces in 1856"], Zhurnal
ministerstva vnutchennikh del [The Journal of the Ministry of Internal
Affairs], 1956, Part 3, Book 2, pp. 199-234. Many other examples can be
given.

54 For the nature of this restriction, see A. Romanovich-Slavatinskii,
Dvorianstvo v Rossii ot nachala XVIII veka do otmeny krepotnogo prava
[Nobility in Russia from the Beginning of the XVIII 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 on Land in Poltava Province"], Zhurnal
ministerstva vnutchennikh del [The Journal of the Ministry of Internal
Affairs], Vol. 40, Book 1 (1860), 1-8, the author remarks that Cossack lands
in that province sell "incomparably" cheaply because only Cossacks are
permitted to buy them. He also asserts that land prices in the sales
reports ("Svedeniia" ["Data"]) were greatly understated.

55 In the pre-famine Ireland (1841), village industries were found to be
economically important and the relationship between income and land/labor
ratio -- negative. See Eric L. Almquist, "Pre-famine Ireland and the Theory
of European Proto-industrialization: Evidence from the 1841 Census," The
Journal of Economic History, 39 (September 1979), 699-718 and Moel Mokyr,

56 The ratio of the weighted slave price of the Lower South to that of
the Upper South in the U.S. was 1.82 in 1830-35 and gradually declined to
1.28 in 1856-60. See Fogel and Engerman, Time, V. 2, p. 73. A ratio of the
highest to the lowest state price would be more relevant here.
Here are a few straws in the wind: with the exception of the Lake region, the percentage increases (or decreases) of serf and of free males in the period 1835-59 by regions were well 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 nominal low serf prices in New Russia and in the Volga regions obtained by our regression. As observed above, these two prices must have been under-estimated.

See Field, The End, pp. 80-81; Blum, Lord, p. 579. The serfowners in the South-western region had a high reputation for efficiency. Among other things, they cultivated sugar beets on a large scale. Ibid., p. 401.

It is of course impossible to judge the effectiveness of any particular set of Inventories without knowing their exact magnitude and local conditions.

Between 1835 and 1859 the number of serfs in the Viatka-Perm' region increased by 42.1 per cent, as compared with the average increase in European Russia of only .95 per cent, and with a reduction in several regions. But these figures may be very inexact because they come from two separate sources and are subject to different definitions. The 1835 figures are taken from P. Keppen, Deviataia 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 1959 figure from Troinitskii, Krepostnoe [The Serf], p. 49.

See sources given in note 59.

Troinitskii, Krepostnoe [The Serf], pp. 55-56; Hoch and Augustine, "The Tax Censuses."


64 Blum, Lord, p. 381. The magnitude of the special debt was taken from Skrebetskii, *Krest'ianskii [Peasant]*, Vol. 4, p. 1241.


66 The regional distribution of the serfowners' debts (without that special amount and without private debts) was taken from Skrebetskii, *Krest'ianskii [Peasant]*, Vol. 4, pp. 1246-49. The lowest ratio of debt to the value of serf estates was found by us in New Russia -- 6.39 per cent. (That region contained less than 400,000 serfs.) In Lithuania it was 12.16 per cent. The highest percentage was in the Volga region -- 29.14 -- followed closely by White Russia, Viatka-Perm' and the Central Industrial region. A comparison of the burdens of landowners' debts over space and time would be very interesting.

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