SEPARATUM

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HETEROGENEOUS LABOUR AND THE DETERMINATION OF VALUE

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Heterogeneity of labour and its implications for the Marxian theory of value has been one of the most controversial issues in the literature of the Marxist political economy. The adoption of Marx's conjecture about a uniform rate of surplus value leads to a simultaneous determination of the values of common and labour commodities of different types and the uniform rate of surplus value. Determination of these variables can be formally represented as a parametric eigenvalue problem. *Morishima*'s and *Bródy*'s earlier results are analysed and given new interpretations in the light of the suggested procedure. The main questions are addressed in a more general context too. The analysis is extended to the problem of segmented labour market, as well.

Introduction

In the definition and analysis of the Marxian labour value homogeneity of labour power is usually postulated. This homogeneity of labour can be viewed from different aspects. First, it means the assumption of a uniform *value creating power* of various kinds of labour in all fields of production. Second, labour power is treated as a homogeneous commodity with respect to the level and structure of the *consumption necessary* for its reproduction. Third, as a result of the first two assumptions, labour will also be homogeneous with regard to the *rate of exploitation.* In such case, labour power employed in different areas can be viewed as part of a homogeneous mass of *average social labour.* These assumptions make the analysis significantly easier but, at the same time, they restrict the validity of the resulting propositions to a large extent.

Heterogeneity of labour and its implications for the Marxian theory of value have been for long debated in the Marxist economic literature. Marx himself was not specific enough about this problem and his passing remarks have been interpreted by different authors in different ways. Most of the discussions have centered around the problem of converting skilled into simple labour,* i.e. determination of the abstract labour equivalent of various kinds of concrete labour. Another issue is concerned with the determination of the value of various kinds of labour power. Here the common standpoint is that the value

*We will use the terms skilled and unskilled as synonyms for complicated and simple. According to Marx, the value creating power of a specific kind of labour varies with the degree of its 'complicatedness' (complexity) and intensity. For the sake of simplicity we will disregard possible variations in labour intensity.

of different kinds of labour is determined by the conditions of their reproduction. In the debates these two issues have been linked to each other, since some remarks of Marx seem to imply a rather close relationship between the value of labour and its complexity (value product). This assertion has been strongly opposed by some economists.

Surprisingly enough, the degree of exploitation (the rate of surplus value) has not been explicitely taken into consideration in these debates, whereas it is an obvious intermediary link between the value of labour power and its value product. The assumption of a uniform rate of exploitation across various kinds of labour power and spheres of production seems to be essential to Marx's theory. Marx visualized it as one of the basic laws of the capitalist mode of production:

"Such a general rate of surplus value – viewed as a tendency, like all other economic laws – has been assumed by us for the sake of theoretical simplification. But in reality it is an actual premise of capitalist mode of production, although it is more or less obstructed by practical frictions causing more or less considerable local differences . . .;" [1]

Adoption of this assumption would greatly simplify the problem of value determination in the case of heterogeneous labour power. We will show in this paper that determination of the values of different commodities and various kinds of labour, and the rate of surplus value can be represented in the form of a simultaneous equations system, as an eigenvalue problem. These results are based on Bródy's [2] and Morishima's [3] contributions to the formal analysis of Marx's economic theory.*

The structure of the paper is the following. First, Morishima's proposal for the determination of conversion ratios will be critically reviewed. Based on this critique we will propose a different solution, which, in turn, will be confronted with Bródy's earlier suggestions. Next, we will address the related issues in a broader framework and formulate some general conclusions. Finally, we will illustrate our solution with a numerical example and reflect on the problem of labour segmentation raised by *Bowles* and *Gintis* [5] and *Reich* [4].

The notation used in this paper:

R (n x n matrix): r_{ij} is the quantity of commodity i used in the production of one unit of commodity j,

M (h x n matrix): m_{sj} is the amount of labour of kind s required for the production of one unit of commodity j,

m^* (1 x n vector): m_j represents the unskilled labour power input into the production of one unit of commodity j.**

*After finishing the Hungarian version of this paper I learned from A. Bródy that U. P. Reich proposed basically the same solution, as I. Since then his paper has been published, see Reich [4]. Despite the essential formal identity of our results there are important differences in the underlying reasoning and interpretation.

**The asterisk above a vector indicates a row vector.

F (n x h matrix):	f_{is} is the amount of commodity i needed in the social reproduction of one unit of skilled labour of kind s from one unit of unskilled labour.
f (n x l vector):	f_i denotes the amount of commodity i necessary for the reproduction of one unit of unskilled labour.
N (h x h matrix):	n_{rs} is the amount of skilled labour of kind r required for the reproduction of one unit of skilled labour of kind s.
n^* (l x h vector):	n_s is the unskilled labour input requirement for the reproduction of one unit of skilled labour of kind s*.
p^* (l x n vector):	vector of the common (non-labour) commodity values.
w_o (scalar):	value of unskilled labour power.
w^* (l x h vector):	values of different kinds of skilled (trained) labour power.
u^* (l x h vector):	u_s denotes the value product of one hour of skilled labour power s, measured in hours of unskilled labour (the ratios for converting skilled labour into simple labour, $u_o = 1$).

The critique of Morishima's conversion ratios

Morishima [3, p. 192f.] presumes, in a way, that unskilled labour power is given for the economy and that the different kinds of skilled labour power are 'produced' from it and used in the production of various commodities. We will show that Morishima eventually treats skilled labour power the same way as the common (non-labour) commodities, i.e. he supposes the same value-process to take place in the production of skilled labour power as in case of common commodities. Morishima defines the values of the common commodities *(p^*)* and the conversion ratios of skilled labour into simple labour *(u^*)* with the following formulae:

$$p^* = p^*R + u^*M + m^* \tag{1}$$

$$u^* = p^*F + u^*N + n^* \tag{2}$$

It can be seen from (1) and from the concept of the conversion ratios that if the value product of one hour of simple labour is one unity, then skilled labour of kind s produces a value of the size u_s in one hour. From the formal definition of the conversion ratios it is tempting to regard them as the values (quasi-values) of different kinds of skilled labour power, although Morishima carefully avoids this interpretation. As we shall see, it would really be difficult to interprete them as values, at least in a capitalist mode of production. The basic difficulty with such interpretation is that it is not in conformity with the Marxian concept of the value of labour power, which defines it as the value of

*It should be clear that in our interpretation n_s will be greater than or equal to 1, since it contains the unskilled labour to be trained into skilled labour.

the consumption basket necessary for its reproduction. One cannot determine the value of labour power in the same way (total labour content) as the values of common commodities, since the value of labour power is equal only to the labour content of the material inputs necessary for its reproduction. Besides, as we shall see, if one wants to keep Marx's basic assumption about the uniformity of the rate of surplus value, then Morishima's conversion ratios *(u)* cannot be equal to the values created in one hour by different kinds of skilled labour, i.e. they are not the real conversion ratios either.

Let w_s be the Marxian value (the value of the necessary consumption) of skilled labour power *s*. Thus the following definitional equation has to hold:

$$w^* = p^*F + w^*N + w_0 n^* \tag{3}$$

From this the rate of exploitation of skilled labour power s (r_s) can be determined by the following equation:

$$r_s = \frac{u_s - w_s}{w_s}, \quad s = 1, 2, \ldots, h, \tag{4}$$

where the numerator is equal to the unpaid labour, the denominator is equal to the paid labour. The term u_s is the 'real' conversion ratio, i.e. the value product of one hour labour measured in terms of hours of simple labour.

If we start from the assumption that labour is homogeneous in terms of exploitation, then the above partial rates of surplus value have to be equal to each other and this equal size is the general rate of surplus value *(r)*:

$$r = \frac{u_1 - w_1}{w_1} = \frac{u_2 - w_2}{w_2} = \ldots = \frac{u_h - w_h}{w_h} = \frac{1 - w_0}{w_0}, \tag{5}$$

where w_0 is the value of simple labour power ($w_0 = p^*f$).

In order to show that Morishima's conversion ratios can not be, in general, consistent with the assumption of a uniform rate of exploitation let us first rearrange equations (5):

$$u_s = (1 + r)w_s \quad (s = 1, 2, \ldots h) \quad \text{and } l = (1 + r)w_0. \tag{6}$$

Now let us substitute these "real" conversion ratios into Morishima's form (2) and divide both sides by $(1 + r)$. As a result we will obtain an alternative definition for the values of skilled labour:

$$w^* = \frac{1}{1 + r} p^*F + w^*N + w_0 n^*. \tag{7}$$

A simple comparison of (3) and (7) will immediately reveal that the values of the various kinds of labour derived from Morishima's conversion ratios will, in general, be different from those implied by Marx's definition. And this proves from a different aspect the fact, pointed out by Morishima himself, too, that his solution will generally give rise to differing degrees of exploitation.

Before giving the correct solution to the problem let us turn our attention to an interesting possibility of interpretation. Namely, there is a single special situation, in which Morishima's conversion ratios could be interpreted as values of different kinds of skilled labour and, at the same time, we could retain the assumption of a uniform rate of exploitation. This special case can be characterized in the following way. Suppose that the social reproduction of skilled labour power can be divided into two separate phases. The first phase is the reproduction of simple, unskilled labour, governed by socio-biological laws. The second phase is the 'skill-production's, subject to the general laws of Commodity production. It is assumed, that the only subject of exploitation, variable capital, is the simple (unskilled) labour. Skilled labour is in no way different from any common commodity product. Workers sell their simple labour power to the capitalists, who in turn use it in different kinds of production processes, partly in the process of skilled labour production. Since skilled labour production is governed by the law of value, the capitalists running this training enterprise will also realize surplus value. The value of skilled labour s is equal to Morishima's conversion ratio (u_s). This value can be divided into two main parts. $(p^*f_s + u^*n_s) + w_0 n_s$ is the sum of the consumed constant and variable capital (recall that the employed skilled labour would be treated here as part of the constant capital). The rest of the total value, $(1-w_0)n_s$ is the surplus realized in this commercialised training process.

where
$$\frac{1-w_0}{w_0} = \frac{1-p^*f}{p^*f} = r$$

is the general rate of surplus value.

This interpretation is, however, disputable from different aspects. Among other things it considers the training of labour power a productive process, which seems to contradict the usual interpretation of the notion of productiveness usually confined to the sphere of material production. However, it is worth referring to Marx, namely that passage in the Capital which seems to sustain such an interpretation. He wrote the following about capitalist commodity production as a special commodity production in which productive labour gains a new sense: "That labourer alone is productive, who produces surplus value for the capitalist, and thus works for the self-expansion of capital. If we may take an example from outside the sphere of production of material objects, a schoolmaster is a productive labourer, when in addition to belabouring the heads of his scholars, he works like a horse to enrich the school proprietor. That the latter has laid out his capital in a teaching factory, instead of in a sausage factory, does not alter the relation. Hence the notion of a productive labourer implies not merely a relation between work and useful effect, . . . , but also a specific, social relation of production . . ." [6]

This quotation is not contrary to the interpretation of Morishima's conversion ratios as values. Another, even more serious, difficulty with this interpretation is, however, the fact that it is contradictory to the empirical observation that workers' wages, in general, cover not only the costs of reproduction of their simple labour power, but they earn more, and that they usually contribute to the costs of their own training. Moreover, even in Marx's view, the costs of training are among the costs which determine the value of labour power. Also, in real life, the owner of skilled labour power is the worker and not the school proprietor as the above interpretation would suggest. Following this idea one could conclude that skilled workers are more or less capitalists: advancing money for their training and getting a surplus out of it. These conclusions are not quite opposite to certain experiences, moreover they seem to agree well with some current concepts of human capital: still we think they are rather disputable.

Thus, in the case of a capitalist mode of commodity production the above value interpretation of Morishima's conversion ratios seems to be unreasonable. Under socialist production relations, however, a similar interpretation of the value of labour power could be more meaningful. In this case the costs of training are covered by society so that Morishima's conversion ratios could be interpreted as the social costs of labour power reproduction and, conclusively, as values.*

A possible correction of Morishima's solution

Analysing the solution suggested by Morishima leads us to an alternative way of determining the conversion ratios. Let us suppose that the value of labour power is determined by the costs of its reproduction. This means that the value of one hour of unskilled labour is defined as

$$w_o = p^* f, \tag{8}$$

while the value of skilled labour is

$$w^* = p^* F + w^* N + w_o n^*. \tag{9}$$

Recall that n_s is greater than 1 and the difference is the amount of simple labour power employed in training labour power s (1 is the trained labour power itself.) Therefore $w_s - w_o$, i.e. the difference between the values of skilled labour s and unskilled labour is, in fact, the cost of training.

*The production price of labour power in socialism is discussed from the same aspect in Bródy [2]

The assumption of a uniform rate of surplus value implies that the relative ratios of the value products of different kinds of labour power are equal to those of their value. Hence the conversion ratios needed for the reduction of skilled labour into simple labour are given by the vector $\frac{1}{w_0} w$.

Dividing (9) by w_0 and denoting the resulting conversion ratios again with vector u we get the following definitional equation:

$$u^* = \frac{1}{w_0} p^*F + u^*N + n^*,$$

or taking into consideration the already known relationship $\frac{1}{w_0} = 1 + r$:

$$u^* = (1 + r)\, p^*F + u^*N + n^*. \tag{10}$$

The above definitions differ from Morishima's formula (2) only in the $(1 + r)$ multiplier before p^*F. Hence we can consider them as its correction.*

Unlike Morishima we derive the ratios from the values of labour power and the uniform rate of surplus value. These variables can be simultaneously determined, together with the values of the common commodities, by solving a parametric eigenvalue problem. We will show this, now. The values of the common commodities can be determined by (1) which can be rewritten in the following form:

$$p^* = p^*R + w^*M + w_0 m^* + r(w^*M + w_0 m^*) = p^*R + (1 + r)(w^*M + w_0 m^*). \tag{11}$$

On the basis of equations (8), (9), (11) the full value-system, consisting of p^*, w^*, w_0 and r, can be determined by the following eigenvalue problem:

$$(w_0, w^*, p^*) = (w_0, w^*, p^*) \begin{pmatrix} o & n^* & (1 + r)m^* \\ o & N & (1 + r)M \\ f & F & R \end{pmatrix} \tag{12}$$

Under normal economic conditions** the above problem will have a unique positive solution and r will be such as to make the dominant eigenvalue of the

*U. P. Reich [4] arrived at the same correction of Morishima's formula but on a rather mathematical basis.

**In an unpublished thesis the author of this paper has extensively examined the closed (eigenvalue) forms of the value system determination. It has been shown that uniqueness of a positive solution can be guaranteed under reasonable economic assumptions, without making use of the indecomposability assumption.

corresponding matrix equal to 1. It is known that in the case of homogeneous (social average) labour the use of a closed form, simultaneous determination of the full value-system can be avoided. In that case the value-system can be recursively determined: first the values of the common commodities as total labour content, then the value of the labour power and the rate of surplus value. In the case of heterogeneous labour and a general (uniform) rate of surplus value the closed forms seem to be indispensable.

Alternative forms for determining the value-system

The above analysis supports and extends an earlier suggestion of Bródy [2], who outlined the determination of conversion ratios as follows: "All we have to do is to disaggregate (or rather not to aggregate) the labour sector in our matrix A. If under Simple Reproduction we have as many rows and columns for labour as the number of different skills, we will still have a non-negative and irreducible matrix yielding a unique positive left-hand eigenvector: values. The relative weights for different skills, that is, their values can be used thereafter to homogenize labour to a common standard." (Bródy, 2, p. 87)

Bródy's assertion is completely correct but needs some further specification. Bródy based his statement on the analysis of the *no-surplus-value* case and gave no mathematical formulae. He even thought that his solution was not completely satisfying when surplus value existed in the economy. This led him to the exclusion of the uniform rate of surplus value from his investigations. We will concretize his description and put it in a mathematical form which differs from ours and also, we will show that his suggestion works in the case of a uniform, different from zero rate of surplus value, too.

We have to remind the reader that in case of an aggregated labour power sector Bródy assumes that the reproduction of labour power does not require labour directly. This could hardly be sustained unless only simple labour were taken into consideration. Nevertheless, we will show that with some rearrangement of the input matrix and modifying the meaning of the labour power sector one can formally get rid of the direct labour requirement.

Let Bródy's augmented and disaggregated input coefficient matrix have the form:

$$\begin{pmatrix} O & \bar{M} \\ \bar{F} & R \end{pmatrix}.$$

If the reproduction of labour power has direct labour input requirements this matrix cannot be the same as ours, which had the following general form:

$$\left(\begin{array}{cc|c} o & n^* & m^* \\ o & N & M \\ \hline f & F & R \end{array}\right)$$

However, from our input coefficient matrix we can define the components of Bródy's disaggregated matrix in such a way, that it should also give the correct solution.

One need not change at all the columns corresponding to the common commodities, therefore $\bar{M}$ in Bródy's matrix will be the same as in ours, i.e.

$$\bar{M} = \begin{pmatrix} m^* \\ M \end{pmatrix}$$

On the other hand, one has to define $\bar{F}$ in the following way:

$$\bar{F} = [f,(F + fn^*)(E - N)^{-1}].$$

It can be easily shown that with these specifications Bródy's matrix will yield the same solution as ours. We have to check only the equations corresponding to the determination of the values of skilled labour power. This equation will be the following from Bródy's formula:

$$w^* = p^*(F + fn^*)(E - N)^{-1}$$

Taking into consideration that $p^*f = w_0$ and multiplying both sides with $(E - N)$, and after some rearrangement, one will immediately see that equations (9) and (13) are equivalent. And this proves our statement.

It will be useful to dwell upon the problem of equivalence of the above two forms, this time from a purely economic point of view. In order to make one unit of skilled labour power s available for productive employment (i.e. for the production of common material commodities), the labour power sector has to reproduce skilled labour of different kinds in amounts shown in the s^{th} column of matrix $(E - N)^{-1}$.

Matrix F contains the *direct* material inputs needed in the reproduction of skilled from unskilled labour power, whereas matrix fn^* shows the *indirect* consumption requirement for this, which is transmitted by the unskilled, simple labour employed in this process (partly as subject to training). Therefore, matrix $(F + fn^*)(E - N)^{-1}$ contains nothing else but the direct-plus-indirect necessary consumption required for the social reproduction of one unit of various kinds of *productively employable* skilled labour power. Thus, the labour power sector in Bródy's approach should be interpreted in a net sense, i.e. the output of these sectors are not different kinds of labour power in general, but labour power available for productive use.

It is also interesting to note that the above interpretation is more in line with the traditional definition of necessary consumption or necessary product at national level. In the political economy textbooks the above concepts are defined as the direct and indirect consumption requirements of workers employed in material production. The above exercise not only shows how the indirect requirement can be accounted for, but also indicates an alternative way of defining the necessary consumption of productive workers.

From the above considerations one can also derive a way in which the double counting of simple labour power to be trained into skilled one can be avoided. It should be clear that for the purposes of planning the physical side of the reproduction process the above augmented input coefficient matrices are not quite suitable. Instead of them it would be more appropriate to use the following form:

$$\begin{pmatrix} o & (n-1)^* & m^* \\ o & N & M \\ f & F+f1^* & R \end{pmatrix}$$

This form of the overal input coefficient matrix can be equally well applied in the analysis of both the value and the physical aspects of the reproduction process.

To show this, let vector q be the production level of the common commodities, vector h the amount of skilled labour of various kinds and h_o the amount of labour left unskilled

(thus $\sum_{i=o}^{h} h_i$ is the total available labour time). The product of the above input coefficient matrix and vector (h_o, h, q) gives the commodity input vector required in the production of the different material and labour commodities. Disaggregating the conditions of physical equilibrium will yield the following inequalities:

$$(n-1)^*h + m^*q \leqslant h_o,$$

the use and the source of unskilled labour,

$$Nh + Mq \leqslant h$$

the use and the source of skilled labour of various kinds,

$$fh_o + (F + f1^*)h + Rq \leqslant q,$$

the size of replacement and necessary product related to the gross product (the difference of the two sides is the surplus product).

The above relations can be rewritten in the following condensed form:

$$\begin{pmatrix} o & (n-1)^* & m^* \\ o & N & M \\ f & F+f1^* & R \end{pmatrix} \begin{pmatrix} h_o \\ h \\ q \end{pmatrix} \leqslant \begin{pmatrix} h_o \\ h \\ q \end{pmatrix}$$

Note that if we write equalities instead of the inequalities then the equilibrium conditions of a self-supporting economy will appear in the form of an eigenvalue problem.

The value-determining form, the equivalent of (12) will in this case be the following one:

$$(w_0, w^*, p^*) = (w_0, w^*, p^*) \begin{pmatrix} o & (n-1)^* & (1+r)m^* \\ o & N & (1+r)M \\ f & F+f1^* & R \end{pmatrix}$$

Reflections on an old debate: skilled and unskilled labour

We do not want to reproduce the whole debate, but still we would like to recall its main elements. At the core of the debate one can find some scattered, seemingly contradictory references in the Capital about the reduction of skilled to simple labour. The following quotations will shed light on the nature of the problem.

"All labour of a higher or more complicated character than average labour is expenditure of labour power of a more costly kind, labour power whose production has cost more time and labour, and which therefore has a higher value, than unskilled or simple labour power. This power being of higher value, its consumption is labour of a higher class, labour that creates in equal times proportionally higher values than unskilled labour does." [6, p. 197]

Note that Marx implies only a mutual correspondence, not some kind of one-way causality between the skilfulness of labour and the value of labour power that exerts it. More skilled labour is the manifestation of a labour power having greater value and, from the reverse aspect, labour power of greater value results in more complicated labour. Only the training costs seem to bring some kind of causality into the description. We will come back to this later. Under the above quotation we can read in the footnote:

"The distinction between skilled and unskilled labour rests in part on pure illusion, or, to say the least, on distinctions that have long since ceased to be real, and that survive only by virtue of a traditional convention . . . Accidental circumstances here play so great a part that . . . the lower forms of labour which demand great expenditure of muscle, are in general considered as skilled, compared with much more delicate forms of labour . . ."

And finally to the reduction of skilled labour:

"Experience shows that this reduction is constantly being made. A commodity may be the product of the most skilled labour, but its value, by equating it to the product of simple unskilled labour, represents a definite quantity of the latter alone. The different proportions in which different sorts of labour are reduced to unskilled labour as their standards are established by a social process that goes on behind the backs of the producers, and, consequently, appear to be fixed by custom." [6, p. 44]

These quotations have been frequently and in many ways interpreted. We will also try to summarize how we understand them. Let us begin with the last one! According to our interpretation Marx says nothing more than that if one believes that the basis of the exchange value is labour value (the abstract labour content of the commodity) and exchange is an ordinary empirical fact then this reduction of various kinds of labour to one common standard must be carried out in practice. On the other hand, according to Marx, this reduction takes place without deliberate and exact measuring, but through trial and error. What can be the "real" ratios saved and distorted by tradition? This question is partly answered in the second quotation. Here again two elements seem to be important. The first one is that Marx emphasizes the deforming influences of tradition which may give rise to considerable and random deviations between the prevailing and real conversion rates. Secondly, he points to the close relationship between the complexity of labour and the qualification of labour power. This element pointedly appears in the first quotation. Marx here says that greater training costs result in more skilled labour and, on the other hand, in a labour power of greater value. In fact, Marx rather clearly declares that labour is assumed to be more complicated (skilled) only because it incorporates greater training costs. Another interesting element in the first quotation is that if the value of some labour power is higher then its value creating power is necessarily greater, too.

Even among those who tend to accept a high correlation between the reproduction costs (value) and skilfulness (complicatedness) of labour there is a disaggreement whether it should be understood as a linear correspondence. The assumption of a uniform rate of surplus value, see equations (6), clearly implies such linearity.

Nor is it quite clear how one should determine the consumption of various groups of labour which can be viewed as socially necessary for their reproduction. In our approach we adopted a view by which the necessary consumption was divided into two parts. One part was given as a uniform consumption pattern necessary for the reproduction of simple, unskilled labour power. Skilled labour consumed more than this only through its training process. Therefore, our approach could be viewed as a *normative* one.

The above solution is, however, not quite satisfactory from a *descriptional* viewpoint. Could the observed consumption of different labour power groups be regarded as the consumption socially necessary for their reproduction? Marx emphasizes that random factors, traditional agreements may significantly divert observed consumption from the socially necessary one. Socially necessary consumption is generally a rather loosely defined concept (in case of homogeneous labour, too.) Consumption of labour power is to a large degree a biologically, ethically, socially and historically determined distributional problem. This is emphasized by Marx himself, too and many authors tend to consider consumption necessary for the reproduction of labour power equal to observed consumption. The question becomes more complicated when heterogeneous labour is considered. In this case it would be a hardly acceptable answer (though a possible interpretation), that the inputs necessary for the reproduction of the different kinds of labour power are equal to their observed, actual consumption patterns. The observable differences in cultural and living levels of various groups of workers are hardly justifiable by the different reproduction requirements. More precisely: if we accepted this concept we would base the determination of social inputs necessary for the reproduction of labour power on the actual distribution patterns. Thus the basic question that would need more investigation can be phrased in the following way. Is there any normative feature in the consumption socially necessary for the reproduction of different kinds of labour power or do we have to consider them as determined merely by the prevailing distribution processes? Anyway, a revision of our previously presented solution only from this point of view would not pose any great problem. All we have to do is to use the actual consumption coefficients of different kinds of labour power and not the consumption of unskilled labour incrased by the training costs.

Another key problem is the determination of the value creative power. Are we right to assume that the value creative powers of different kinds of labour are proportional to their values, i.e. to assume a uniforme rate of surplus value? Although Marx considered the emergence of a uniform rate of surplus value as a tendency-law, in reality this law is obstructed by several factors: differences between abilities, the fact that various forms of education are not available for everybody, differing social prestige of different jobs etc. The question is whether the effect of all these factors could be considered random or not. If not, one should be able to determine in some way either the different rates of exploitation or the value creating power of different kinds of labour. If one can determine any of the two magnitudes then the other can be determined through the value of labour power. If not, the values remain undetermined.*

These are some of the unsolved key problems and the alternative ways to handle them. We leave them without definite answers and in the next part we will illustrate the closed-form determination of the full value system by a numerical example. We will also examine a procedure, in which a uniform rate of surplus value but different rates of exploitation are assumed.

A numerical example

Let us consider an economy where three producing branches are distinguished: industry, agriculture and luxury industry. Let their total output be 1000, 2000 and 100 units, respectively. The input matrix of the economy is the following:

Table 1
Intersectoral flows

Producer	User		
	industry	agriculture	luxury industry
industry	300	400	20
agriculture	200	200	30
luxury industry	0	0	0

*S. *Bowles* and A. *Gintis* [5] suggest an alternative solution in their paper. They define the values as vectors rather than scalars in order to avoid the reduction problem. At the same time the rate of surplus value is treated as a vector as well.

We suppose that workers can be classified into three homogeneous groups: highly skilled, skilled and unskilled workers. Let the labour input matrix, measured in working hours, be as given by *Table 2.*

Table 2
Labour used in production

	industry	agriculture	luxury industry
highly skilled	50	60	10
skilled	400	200	0
unskilled	200	800	60

From the above production data we can calculate the following input coefficients:

$$m^* = (0.20 \quad 0.40 \quad 0.60)$$

$$M = \begin{pmatrix} 0,05 & 0.03 & 0.10 \\ 0.40 & 0.10 & 0.00 \end{pmatrix}.$$

$$R = \begin{pmatrix} 0.30 & 0.20 & 0.20 \\ 0.20 & 0.10 & 0.30 \\ 0.00 & 0.00 & 0.00 \end{pmatrix}$$

Suppose that the consumption necessary for the reproduction of one hour of simple labour is given by

$$f = \begin{pmatrix} 0.05 \\ 0.30 \\ 0.00 \end{pmatrix}$$

Let the input coefficients in the training of skilled workers be as follows:

$$n^* = (1.10 \quad 1.05)$$

$$N = \begin{pmatrix} 0.02 & 0.10 \\ 0.00 & 0.00 \end{pmatrix}$$

$$F = \begin{pmatrix} 0.10 & 0.05 \\ 0.30 & 0.20 \\ 0.00 & 0.00 \end{pmatrix}$$

With the above data the solution of the parametric eigenvalue problem (12) will be the following:

$$r = 1.2 \text{ (the rate of exploitation is 120 \%).}$$

The values of one hour of different kinds of labour power are

$$w_0 = 0.4545, \quad w_1 = 1.0742, \quad w_2 = 0.9206,$$

and finally the values of commodities will be

$$p_1 = 1.9517, \quad p_2 = 1.1913, \quad p_3 = 1.5884,$$

In our example one hour of highly skilled labour turns out to be 2.36 times, skilled labour 2.03 times as complicated as that of simple labour.

Uniform rate of surplus value and different rates of exploitation

Throughout our earlier discussion of the alternative approaches to the value determination problem we have assumed that the rate of surplus value is the same as the degree of exploitation. It is, however, possible to connect the discussed alternatives by retaining the assumed homogeneity of workers in surplus value production allowing though, at the same time, for different degrees of exploitation, a segmented labour power market.* One could reason in the following way. Suppose that the inputs socially necessary for the reproduction of various kinds of labour power can be determined by some appropriate method. Based on this and other input parameters we determine the full value-system assuming a uniform rate of surplus value. Next, taking the resulting value system as given, one can compute the value of the actual consumption of different labour power groups. The actual degree (rate) of exploitation could then be identified as the ratio of the value product to the value of the actual consumption of various kinds of labour power.

But how could one determine the socially necessary consumption of the various labour groups? One possible way to do this could be the following. Total social expenditure of the workers involved directly or indirectly in productive activities should be split into two parts: expenditures connected to living and training (education). Total consumption connected to living expenditures divided by total working hours could be considered as the consumption socially necessary for the reproduction of one hour of simple labour power. The per hour necessary consumption of a particular kind of skilled labour power

*The segmentation problem was raised by Bowles and Gintis [5] and also taken up by Reich [4] Here we propose a somewhat different treatment of the problem.

could then be defined as the sum of the necessary consumption of simple labour power and the per hour training expenditure. This way the cost of training and the historical-ethical element would appear together in the determination of the value of labour power, even the random deviations would be levelled out by means of averaging.

The following example will hopefully illuminate the outlined procedure. Suppose that inputs for reproduction of the groups of workers are known and disaggregated into living and training consumption, is in *Table 3.*

Table 3

Living and training consumption of different labour power groups

	highly skilled		skilled		unskilled		total	
	living consumption	training consumption	living consumption	training consumption	living consumption	training consumption	living consumption	training consumption
industry	24	19	30	30	40	–	94	49
agriculture	135	55	180		250	–	565	175
luxury-industry	0	0	0	0	0	–	0	0
highly skilled	0	4	0	60	0	–	0	64
skilled	0	0	0	0	0	–	0	0
unskilled	0	18	0	30	0	–	0	48

Thus, in our example 137, 830 and 100 units of industrial, agricultural and luxury-industrial surplus product are created in the economy, and for this 184, 600 and 1108 highly skilled, skilled and simple labour hours are utilized. Capitalists use 1892 labour hours and give 94 units of industrial product and 565 units of agricultural product to workers for their consumption. Hence, the living consumption coefficients per hour will be the same as those of necessary consumption of simple labour *(f)* in our earlier example: (0.05; 0.30; 0.00). The training expenditure coefficients are the same, too, therefore the value systems are equal.

With the computed value system we can now determine the value of actual consumption patterns in Table 3 and compare them to the value products of the various kinds of labour. The actual rates of exploitation will in our example significantly differ from each other. The actual rate of exploitation of simple labour power is 195 %, that of skilled labour power is 120 % and that of highly skilled labour is 35 %. Hence the labour power market seems to be significantly segmented.

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РАЗНОРОДНЫЙ ТРУД И ВЕЛИЧИНА СТОИМОСТИ

Э. ЗАЛАИ

В теории трудовой стоимости *Маркса* при анализе величины стоимости рабочая сила обычно выступает как однородная. Эта однородность может пониматься в отношении ряда признаков. Наиболее спорным является сведение сложного труда к простому труду. В этих дискуссиях сложность труда, то есть его способность к созданию стоимости и определение стоимости рабочей силы выступают взаимосвязано. Гипотеза Маркса о существовании единой нормы прибавочной стоимости предполагает прямую зависимость между двумя указанными величинами.

Моришима предпринял попытку определить пропорции пересчета (сведения) сложных видов труда в простой труд. Однако его метод дает как правило различные нормы прибавочной стоимости при разных видах рабочей силы. Его пропорции пересчета при своеобразных условиях могут рассматриваться как стоимость квалифицированной рабочей силы.

При предположении единой нормы прибавочной стоимости стоимость обычных товаров и различных видов рабочей силы, а также норма прибавочной стоимости могут быть определены только одновременно, симультанным образом. Математически определение системы стоимости может быть представлено в форме параметрического уравнения собственного значения. На основании определенных выше стоимостей могут быть выведены и пропорции пересчета. Полученное решение формально может рассматриваться как уточнение уравнения Моришимы. Анализ подтверждает и развивает положения, выдвинутые венгерским экономистом А. *Броди.* Конкретизируя его положения, представленные при определении стоимости матрица полных затрат в сектор рабочей силы получают новое толкование. Это новое толкование открывает возможности для нового подхода к понятию необходимого продукта.

Обзор и анализ дискуссии о неоднородных видах труда выдвигает возможность нового подхода к вопросу сегментированного рынка рабочей силы. Стоимости различных видов рабочей силы можно представить как суммы средних стоимостей средств жизни рабочих и издержек по их обучению. На базе расхождений между стоимостями рабочей силы, определяемых указанным образом, и стоимостями фактического потребления можно судить о сегментации рынка рабочей силы

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