# ESTIMATING SECTORAL RATES OF SURPLUS VALUE: METHODOLOGICAL ISSUES

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## ABSTRACT

The 'New Interpretation' (NI) argues that Marxian value categories can be measured using price variables through the concept of monetary expression of labour time (MELT). Starting from the central insight of the NI, this paper focuses on the estimation of sectoral rates of surplus value. It will be suggested that the MELT is decomposed into two concepts, 'value expression of labour time' and 'monetary expression of value'. As a result of this theoretically general consideration, the NI will be critically examined.

## 1. INTRODUCTION

The 'New Interpretation' (NI) of Marxian value theory developed by Duménil (1980), Foley (1982), Lipietz (1982) and others has contributed much to macro-level empirical studies. Unlike conventional method using input–output data, the NI drawing upon value-form theory opened the way to connect price and labour time directly through the concept of monetary expression of labour time (MELT). Although debate continues about the methodological perspective and logical consistency of the NI,[1] it cannot be denied that the NI changed the terrain in which Marxian value theory is

[1] Shaikh and Tonak, who give a full-fledged account on empirical estimates of the US economy based on conventional input–output approach, criticize that in the NI 'the whole relation between surplus value and profit is turned on its head' (Shaikh and Tonak, 1994, p. 179). See also Fine *et al.* (2004). On the recent controversy over the NI's logical consistency, see Kliman (2001), Mohun (2003), Kliman and Freeman (2006) and Mohun and Veneziani (2007).

discussed. In particular, it has become clear that a consistent theory of the MELT or 'value of money' (Foley, 1982) must be incorporated into any serious research based on Marxian value theory.

Most NI theorists have emphasized that the NI's main subject area is the aggregate relationship between value and price. Mohun (2004, p. 87) may be an exception in that he pursued the price–value deviation in the NI, albeit with a reservation that 'Within the DF [Duménil–Foley] approach this sort of proposition is at best of only doubtful interest'. Rieu (2006), however, showed that a specific value–price relation on a sectoral level is implied in the NI. This point will be pursued further in the present paper. The aim here is to explore the ways in which the NI will be used to estimate Marxian value categories on a microeconomic level. Instead of encompassing all the theoretical issues relating to the NI, this paper will focus on the sectoral estimation of Marxian ratios such as value of labour power and rate of surplus value.

On the other hand, in the Marxian literature, most studies estimating differential rates of surplus value have so far been done at a rather aggregated level such as the entire manufacturing sector.[2] In the NI literature, this tendency has been enhanced by its emphasis on the aggregate aspect of macro-economy. In what follows, this paper will pursue the theoretical consequences of the NI with regard to its limitations in estimating sectoral rates of surplus value. This is necessarily intertwined with the problem of treating labour heterogeneity and skills (Roberts, 2004), which has been put aside by the NI theorists (Mohun, 2004, p. 72). Starting from the central insight of the NI, this paper will clarify the effect of introducing labour heterogeneity into the NI.

It is worth noting that the issues involved here are more generally connected with 'single-system' labour theory of value that concurs with the NI regarding the value of labour power. This is because, at least in a formal aspect, the only difference between single-system approaches (e.g. Lee, 1993; Moseley, 1993) and the NI lies in measuring the value of constant capital, which is not directly related to the issue of estimating sectoral rates of surplus value.

The structure of the paper is the following. Section 2 treats the problem of value of labour power in the NI. Mohun's (2004) discussion will be critically examined. Section 3 discusses the problem of sectoral rates of surplus value. First, the existing literature will be examined critically. Second, a simple application of the NI postulate will be considered. Third, it will be proposed

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[2]  Shaikh and Tonak (1994, pp. 161–172) provide a comprehensive survey of the related literature with their own estimates on the US economy.

that the MELT is decomposed into 'value expression of labour time' and 'monetary expression of value', and measurement of sectoral rates of surplus value will be clarified based on this decomposition. A simple application of the standard NI will be shown to hold only in specific cases with restrictive assumptions. Section 4 concludes.

## 2. SECTORAL VALUE OF LABOUR POWER

Consider a simple formal structure of the NI summarized by Fine *et al.* (2004) as follows. Here $P$, $R$, $w$, $L$, $S$ and $m$ denote, respectively, total profit, total net revenue, money wage rate, total amount of living labour, total surplus value and the MELT.[3]

$$P = R - wL \qquad (1)$$

$$S = L - \frac{wL}{m} \qquad (2)$$

$$R = Lm \qquad (3)$$

While equation (1) is an identity, equations (2) and (3) hold if and only if the following two postulates of the NI are supposed (Rieu, 2006, pp. 259–260).

*Postulate 1:* The MELT is defined with regard to net product, instead of gross product.

This postulate is formulated as equation (3), which explicitly chooses total net product as something whose quantity is conserved during the Marxian procedure of transforming values into prices of production.

*Postulate 2:* Value of labour power (VLP) is defined as the ratio of money wage to the MELT.

$$\text{VLP} = \frac{w}{m} \qquad (4)$$

Equation (2) holds under the definition given by equation (4) because surplus value is the difference between total living labour and total value of labour power, $S = L - \text{VLP} \cdot L = (1 - \text{VLP})L$.

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[3] Fine *et al.* (2004, p. 5) originally adopted the concept of labour equivalent of money defined as the inverse of the MELT. Therefore, equations are slightly modified here.

One question arises here immediately: if equation (4) is also applied on a sectoral level as the following equation (5) (where $w_i$ denotes wage rate in the $i$th sector), what impact does this view give to the NI?

$$\text{VLP}_i = \frac{w_i}{m} \tag{5}$$

This question has not been clearly answered in the works of the NI theorists, who have mainly focused on aggregate variables. Mohun (2004, p. 75), however, explicitly stated that this does 'not necessarily hold in each individual firm'. According to Mohun, VLP and $w$ are formed out of similar averaging process as follows where $L_i$ denotes the amount of living labour in the $i$th sector.

$$w = \sum_i w_i \frac{L_i}{L}$$

$$\text{VLP} = \sum_i \text{VLP}_i \frac{L_i}{L}$$

Then, using equation (4),

$$\sum_i L_i \left( \text{VLP}_i - \frac{w_i}{m} \right) = 0 \tag{6}$$

From this relation, he concludes 'only in the case of a uniform wage rate will the VLP per hour of labour hired be the same in each firm' (Mohun, 2004, p. 75). This conclusion, however, can be shown to conflict with his adherence to an aggregate relation. On the one hand, if equation (5) holds, equation (6) automatically holds without the assumption of a uniform wage rate. On the other hand, unless equation (5) holds, equation (6) does not necessarily mean a uniform $\text{VLP}_i$ even in case of a uniform wage rate ($w_i = \overline{w}$), since the following does not imply $\text{VLP}_i = \dfrac{\overline{w}}{m}$ for all $i$'s.

$$L_1 \left( \text{VLP}_1 - \frac{\overline{w}}{m} \right) + L_2 \left( \text{VLP}_2 - \frac{\overline{w}}{m} \right) + \ldots + L_n \left( \text{VLP}_n - \frac{\overline{w}}{m} \right) = 0$$

To make matters worse, unless equation (5) holds, one cannot know $\text{VLP}_i$ even though data on sectoral employment, wage rates and $m$ are given in equation (6). An way out of this dilemma is to define $\text{VLP}_i$ as VLP when $w_i$'s are equalized. This, however, requires an additional definition other than equation (6). Therefore, one is faced with the choice between the indeterminacy of $\text{VLP}_i$ or defining it as equation (5).

Furthermore, if we recollect that equation (4) in the NI is vindicated because labour power is not a 'capitalistically produced' commodity,[4] an obvious implication is that the same logic can also be applied at the level of individual labour power. Therefore, the answer implied by the NI's discussion on the commodity labour power is that the sectoral value of labour power can and should be measured by the ratio of the money wage to the MELT.

## 3. SECTORAL RATES OF SURPLUS VALUE

### 3.1 *Critical reading of the literature*

As is well known, Marx always put an emphasis on the qualitative difference between various concrete labours and the necessity of reducing them to homogeneous and socially necessary abstract labour. The only reason he ignored this issue in *Capital* was just for the sake of analytical simplicity. The following passage succinctly shows Marx's position on this point.

> More complex labour counts only as *intensified*, or rather *multiplied* simple labour, so that a smaller quantity of complex labour is considered equal to a larger quantity of simple labour. Experience shows that this reduction is constantly being made . . . In the interests of simplification, we shall henceforth view every form of labour-power directly as simple labour-power; by this we shall simply be saving ourselves the trouble of making the reduction. (Italic original: Marx, 1976, p. 135)

The denominator of the MELT is total working time measured by the clock-hour, not socially necessary abstract labour hour. However, the issue of skilled labour has been neglected or at best, just assumed to be solved in the NI literature. For example, Lipietz (1985, p. 41) assumed that 'value added by skilled labour has been reduced . . . to a simple labour equivalent'.

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[4] This logic was persuasively put forward by Mohun as follows:

> . . . the unequal exchange forced by differing compositions of capital combined with the competitive equalisation of the rate of profit does not apply to the exchange of labour-power for a wage, because neither composition of capital nor rate of profit is involved in the 'production' of people. Hence in general the value of labour-power is the money wage divided by the monetary expression of labour-time. (Mohun, 2003, pp. 90–91)

Starting from this logic, unlike other NI theorists (Lipietz, 1982; Glick and Ehrbar, 1987; Campbell, 2002), Mohun consistently showed that value of labour power cannot be reduced to the value of wage goods basket in the NI.

This assumption might be plausible in so far as one is interested only in presenting the macro-relation between aggregate value and price, yet it requires further examination if one tries to estimate Marxian ratios on a sectoral level. It is highly probable that the sectoral distribution of abstract labour time deviates from that of labour time measured by the clock-hour even when total working time is equal to total abstract labour time.

More generally, Fleetwood (2001) raises an objection to usual mathematical formulation of Marxian value starting with the assumption of homogenized labour.

> . . . [a typical price of production model] contains a vector for labour (*l*). What kind of labour is this? Whilst models of this kind almost never spell it out, it does appear to be the kind of labour that could be observed interacting with the technology (*A*), and receiving a wage (*w*)—i.e. it is individual and concrete labour. Yet for Marx, the 'substance' of value is socially necessary and abstract labour. (Fleetwood, 2001, p. 61)

Fleetwood's (2001) objection is not only related to the issue of reducing concrete to abstract labour, but also to the distinction between labour and labour power. It should be noted that Marx's economic theory focuses on the consideration that different amounts of labour may be extracted from the nominally same amounts of labour time. One of the NI theorists, Lipietz (1982), tried to conceptualize this point with 'tensor of exploitation', which is dependant on the length and intensity of the working day.[5] This has also been one of the important contributions elaborated by a radical version of the efficiency wage hypothesis (Bowles, 1985; Bowles and Gintis, 1988). One trivial case in which these issues may be assumed away is the case of proportional extraction of socially necessary abstract labour quantities from individual and concrete labour quantities. Actually, Gouverneur (1990) stretches it far enough to define the value of an individual commodity as its price over the MELT:

> It is worth noting that dividing the price of any commodity (or group of commodities) by E [monetary expression of values] gives an adequate measure of total productivity in real terms for the commodity(ies) concerned . . . The price/E ratios, on the other hand, express the number of hours of past and present labour necessary

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[5] This conception, however, has attracted little attention and has not been addressed further in the NI literature.

to produce one unit of the commodity considered: they make it possible to obtain a fairly accurate picture of the growth of total real productivity. (Gouverneur, 1990, p. 8)[6]

If one considers the issue of sectoral value transfers, however, Gouverneur's (1990) proposal cannot even be a first approximation, let alone an 'adequate' measure. Even Gouverneur (1990, p. 16) himself admits that his theoretical perspective is 'unorthodox' in that 'the skill-and-intensity of labour has been regarded irrelevant as far as value creation is concerned'.

To the best of my knowledge, Foley (2005) is the only exception that treated this issue seriously. With regard to the economic measurement of social labour time as 'a pragmatic issue', he vindicates the standard procedure of the NI as follows:

> This approach regards social-labour time as a 'dose' of all the qualities of labour in fixed proportions. It amounts to the assumption that different qualities of labour are present in the same proportions in all sectors of production, but leaves open the question of whether different qualities of labour are subject to the same rate of exploitation . . . This method leads to estimating the MELT as the ratio of a measure of value added to the number of employed workers or to unweighted total labour time. (Foley, 2005, p. 41)

Although Foley (2005) hints at the possibility of differential exploitation of different qualities of labour, he seems to assume that this is averaged out because of a simplifying assumption that different group of workers are present in the same proportions in all sectors. As Cartelier (2006, p. 298) notes, however, just assuming averaging out cannot be a 'pragmatic' solution of the 'unsolved problem' in that it does not pursue the relationship between value and price thoroughly. Furthermore, there is little empirical evidence to support Foley's assumption. Rather, considerations of the reality of contemporary capitalist countries suggest otherwise. It seems reasonable to suppose that those proportions are different across sectors and fairly stable over time, at least in some cases. This may be all the more possible because of the existence of segmented labour markets, e.g. between regular and non-regular workers or native and immigrant workers. A certain group of overexploited

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[6] Recently, this viewpoint has been revived in a more extreme way by Freeman (2004, pp. 58–60), which is in the context of the so-called 'Temporal Single-System Interpretation' (TSSI). After presenting an essentially same calculation procedure with Gouverneur (1990), Freeman (2004, p. 59) argues that this is 'the simplest and most direct—but also the most rigorous—interpretation of Marx's theory of value'. On the theoretical difference between the NI and the TSSI, see Mohun (2004).

workers may be concentrated on specific sectors without free mobility for a certain period of time. Foley (2005, p. 41) himself accepts the necessity of labour quality adjustment in case 'we are interested in the degree to which international foreign exchange markets equate social labour across different countries'. A similar problem will arise if one tries to estimate differential sectoral rates of surplus value. Therefore, some adjustments for the qualitative differences in labour are inescapable.

### 3.2 A simple application of the NI

A simple application of the NI's logic to an individual sector provides a way of measuring sectoral rates of surplus value. If one accepts equation (5), sectoral rates of surplus value can be represented as

$$e_i = \frac{L_i - \text{VLP}_i L_i}{\text{VLP}_i L_i} = \frac{1 - \text{VLP}_i}{\text{VLP}_i} = \frac{1 - \dfrac{w_i}{m}}{\dfrac{w_i}{m}} = \frac{m}{w_i} - 1 \tag{7}$$

It is easily known from equation (7) that equal wage rates imply equal rates of surplus value, namely $w_i = w_j$ implies $e_i = e_j$, and vice versa. Gouverneur (1990), on reasoning similar to the NI, implicitly regards equation (7) as the rate of surplus value in the $i$th sector.[7]

> As far as method is concerned, the calculation of E [monetary expression of value] makes it possible to provide theoretically correct estimates of the rate of surplus value (or surplus labour) *at any level* one may wish to consider . . . (Italic added: Gouverneur, 1990, p. 17)

It is obvious, however, that sectoral rates of surplus value also depend on other conditions of exploitation such as labour intensity, not only on wage rate. Without a doubt, there exists an actual tendency of equalizing these conditions of exploitation by free mobility of labour across sectors. This might be regarded as one of the Marxian 'perfect competition' conditions for analysing the existence of equilibrium prices, such as the so-called transformation problem.[8] When one tries to measure sectoral rates of surplus value

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[7] Gouverneur's (1990) formulation is a corollary of his viewpoint on the relationship between commodity value and his 'monetary expression of value' concept equivalent to the MELT. See also footnote 10.

[8] Here the term 'perfect competition' is just used in the sense of analogy, since the neoclassical concept of perfect competition is entirely alien to Marx's economics.

mainly with data consisting of actual market prices, not equilibrium prices in any sense, however, it is not desirable to assume equalized conditions of exploitation from the outset.

In a nutshell, developing a novel measure for sectoral rates of surplus value is important for two closely intertwined reasons: first, equal exploitative conditions cannot be assumed from the outset; second, reducing concrete labour to abstract labour to which scant attention has been paid must be integrated into the NI framework. Therefore, an important focus of any research agenda premised upon the NI should be to create such a measure.

### 3.3   Decomposing the MELT

In an attempt to measure sectoral rates of surplus value, two different issues must be considered. First, surplus value realized in a certain sector may be quantitatively different from produced surplus value due to the transfer of value between sectors. This is related to the problem of value–price deviation. Second, equal amounts of clock-hour may produce different amounts of socially necessary abstract labour.[9]

With this in mind, it will be proposed here to decompose the MELT into the product of 'value expression of labour time (VELT)' and 'monetary expression of value (MEV)'.[10] While value expression of labour time implies how many hours of socially necessary abstract labour correspond to an hour of concrete individual labour, monetary expression of value represents how many units of money correspond to an hour of abstract labour. Therefore, using the notion of equation (3), one obtains equation (8), where VNP denotes total value of net product.

$$m = \frac{R}{L} = \frac{\text{VNP}}{L} \cdot \frac{R}{\text{VNP}} = \text{VELT} \cdot \text{MEV} \qquad (8)$$

According to the NI version of Marxian value theory, total working hours, total abstract labour hours and total prices of net product have one-to-one

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[9] In a similar vein of criticizing the NI with this paper, Stamatis (1998–99, p. 40) notes four factors, the quantity of the various concrete private labours embodied in commodities, the nominal wage rates, the capital intensity and the supply–demand relationship, as elements determining 'the measure of equivalence of labour as commodities'.

[10] Gouverneur (1990) used the term 'monetary expression of value' instead of the MELT because he disregards differences in various concrete labours. In other words, he straightly regards an hour of every concrete labour as an hour of 'value'. Therefore, this paper's 'monetary expression of value' is different from Gouverneur's (1990). On the other hand, Krause (1982) and Roberts (2004) reached almost the same concept, although they did not use the term 'value expression of labour time'.

correspondence on a macro-level. Furthermore, the distinction between MEV and VELT will not make any analytical difference. Therefore, the absolute magnitude of the MELT does not matter and can be safely assumed to be equal to one without loss of generality, which is usually the case in the NI literature.

The story is different, however, when it comes to the sectoral level. Similar to the aggregate equation (8), the MELT at the sectoral level can also be decomposed as follows:

$$m_i = \text{VELT}_i \cdot \text{MEV}_i \tag{9}$$

At first, the $i$th concrete, individual labour must be homogenized to a certain amount of socially necessary abstract labour by the $\text{VELT}_i$, and is then transformed to a certain quantity of money by the $\text{MEV}_i$. The magnitude of $\text{VELT}_i$ depends on the coefficient of reducing concrete to abstract labour and 'tensor of exploitation' (Lipietz, 1982). If the $i$th labour is more skilled-than-average labour, the $\text{VELT}_i$ will be greater than one.[11] The harsher exploitative condition in the $i$th sector is also connected with a larger $\text{VELT}_i$. The sectoral $\text{VELT}_i$'s will be equal only in the case when all the concrete labours are homogenized to the same amount of abstract labour and all the exploitative conditions are equalized across sectors.

The implication of equation (9) can be illustrated by a numerical example given by Glick and Ehrbar (1987). Table 1 is an initial value scheme of a three department model, where $C$, $V$ and $S$ represent, respectively, constant

*Table 1. Values (abstract labour time)*

|                | $C$ | $V$ | $S$ | $Total$ |
| -------------- | --- | --- | --- | ------- |
| Department I   | 225 | 90  | 60  | 375     |
| Department II  | 100 | 120 | 80  | 300     |
| Department III | 50  | 90  | 60  | 200     |

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[11] Throughout this paper, the skill scales are assumed to be adjusted so that the coefficient of average labour is equal to one. The scales can also be adjusted so that the least skilled labour has coefficient one. This, however, would not alter any relevant result. It must also be emphasized that 'skill' here is not defined in the narrow sense of the term. As the concept of $\text{VELT}_i$ is consistently linked to sectoral differences between concrete, individual labour time and socially necessary, abstract labour time, it is also determined by working conditions such as labour intensity in the sector concerned.

*Table 2. Prices of production in the NI*
*(in dollars)*

|  | $C^p$ | $V^p$ | $S^p$ | *Total* |
|---|---|---|---|---|
| Department I | 279.8 | 90 | 96.5 | 466.3 |
| Department II | 124.3 | 120 | 63.8 | 308.1 |
| Department III | 62.2 | 90 | 39.7 | 191.9 |

*Table 3. Monetary expression of value (dollar/abstract labour time)*

|  | $(A)\ \Sigma(V_i + S_i)$ | $(B)\ \Sigma(V_i^p + S_i^p)$ | $(B/A)\ \text{MEV}_i$ |
|---|---|---|---|
| Department I | 150 | 186.5 | 1.2433 |
| Department II | 200 | 183.8 | 0.9190 |
| Department III | 150 | 129.7 | 0.8647 |
| Total | 500 | 500 | |

capital, variable capital and surplus value. The NI results of the transformation procedure are shown in table 2, where $C^p$, $V^p$ and $S^p$ are the same variables measured in dollars.[12]

MEV$_i$'s are calculated in table 3. It is easily known that the MEV is equal to one on aggregate level because $\Sigma(V_i + S_i) = \Sigma(V_i^p + S_i^p)$. The reason the sectoral MEV$_i$'s differ is, above all, linked with the sectoral transfer of value. If all MEV$_i$'s have the same magnitude, values will be equal to prices of production. On a sectoral level, therefore, MEV$_i$ depends on the difference between sectoral organic composition of capital and the social average. For example, $\text{MEV}_1 = 1.2433$, because commodities are produced with the highest organic composition of capital in the department I. As is well known, commodities produced with higher-than-average organic composition of capital have prices of production greater than their values.[13] This implies that the MEV$_i$ is an increasing function of the organic composition of capital in the $i$th sector. Besides the organic composition of capital, market elements such as monopoly power could also affect the magnitude of MEV$_i$. If the

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[12] As Glick and Ehrbar (1987) proposed, table 2 can be derived from table 1 using 'iterative method' originating from Shaikh (1977). It can also be derived straightly through a simultaneous equation method. See Itoh (2005) and Rieu (2006).

[13] This is a part of Marx's rules about the relationship between organic composition of capital and value–price deviation in *Capital* vol. 3. As the NI defines aggregate equality with regard to net product, not gross product (Postulate 1 in section 2), these rules are not kept intact. However, Marx's insight about the relation between value–price deviation and composition of capital is also supported in the NI, albeit in a modified form. For details, see Rieu (2006, pp. 265–266).

*Table 4.  Value expression of labour time*

|                | (A) $L_i$ | (B) $\Sigma(V_i + S_i)$ | (B/A) VELT$_i$ |
|----------------|-----------|-------------------------|----------------|
| Department I   | 150       | 150                     | 1              |
| Department II  | 230       | 200                     | 0.87           |
| Department III | 120       | 150                     | 1.25           |
| Total          | 500       | 500                     |                |

capital in the *i*th sector had some kind of monopoly power prohibiting other capitals from entering into its business, it could maintain monopoly price greater than equal-rate-of-profit price for some time. This implies that the same quantity of abstract labour is exchanged against more units of money in the *i*th sector, which means that the MEV$_i$ is above average.

On the other hand, as individual concrete labour and socially necessary abstract labour are not distinguished in the conventional NI, VELT$_i$'s are not considered explicitly. Or in other words, all VELT$_i$'s are implicitly assumed to be equal. As this assumption is a very restricted one, it must be removed in the estimation of sectoral Marxian ratios.[14] This implies that we need separate data on the same three department model measured in individual and concrete labour time.

In order to pursue this point, let us consider a simple numerical example in table 4. Here it is assumed that the labour in the department III is skilled, and the labour in the department II is unskilled, compared with social average in the department I. Therefore, 120 hours in the department III creates 150 abstract labour hours, while 230 hours in the department II does only 200 abstract labour hours. In this case, all VELT$_i$'s are different, although the aggregate VELT is equal to one.[15] For example, 230 hours of the labour in the department II is homogenized to 200 hours of abstract labour first, and it is transformed into 183.8 dollars in table 3. The implication of the suggested decomposition of this paper becomes clear if we compare table 4 with table 5, which is a trivial case of equal VELT$_i$'s. In table 5, all the labours are equal in the sense that an hour of individual concrete labour creates an hour of

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[14]  An important exception is sectoral value of labour power. As in equation (5), it can be defined without using the MEV$_i$ and the VELT$_i$. This is because of the NI's logic on the commodity labour power presented by Mohun (2003) above.

[15]  Credit must be given to Itoh (1980, pp. 74–79) for the method of comparing three tables simultaneously. He distinguished 'produced value' and 'acquired value', instead of labour time and value.

*Table 5. Value expression of labour time: a trivial case*

|  | (A) $L_i$ | (B) $\Sigma(V_i + S_i)$ | (B/A) $\text{VELT}_i$ |
|---|---|---|---|
| Department I | 150 | 150 | 1 |
| Department II | 200 | 200 | 1 |
| Department III | 150 | 150 | 1 |
| Total | 500 | 500 | |

socially necessary abstract labour. Combining table 5 with table 3 shows that the decomposition of the MELT into VELT and MEV is redundant in this case.

### 3.4  A general specification for sectoral rates of surplus value

It is now possible to formulate sectoral rates of surplus value based on the suggested decomposition of the MELT. For the $i$th sector, the rate of surplus value may be written as

$$
e_i = \frac{\text{VELT}_i \cdot L_i - \text{VLP}_i L_i}{\text{VLP}_i L_i} = \frac{\text{VELT}_i - \text{VLP}_i}{\text{VLP}_i}
$$
$$
= \frac{\text{VELT}_i}{\frac{w_i}{m}} - 1 = \text{VELT}_i \left(\frac{m}{w_i}\right) - 1 \tag{10}
$$

From equation (10), it is quite clear that sectoral rates of surplus value are systemically distorted according to equation (7). If the labour in the $i$th sector is skilled labour, equation (7) underestimates the rate of surplus value. Only when the skill of labour in the $i$th sector is equal to the social average will equation (7) provide a proximate estimate:[16]

$$
\text{VELT}_i \geq (<) 1 \rightarrow e_i \geq (<) \frac{m}{w_i} - 1
$$

It is precisely because that the determination of $\text{VELT}_i$ is crucial for estimating sectoral rates of surplus value. If the concrete labour in the $i$th sector produces more abstract labour than the social average within an equal amount of clock-hour, its rate of exploitation is greater than estimated by the simple application of the NI procedure, which assumes that every clock-hour is equal to the same amount of socially necessary abstract labour time.

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[16]  See also footnote 11.

Furthermore, it is easily shown that the necessary and sufficient condition for sectoral rates of surplus value being equalized is as follows:

$$
\begin{aligned}
e_i = e_j &\leftrightarrow \frac{\text{VELT}_i}{w_i} = \frac{\text{VELT}_j}{w_j} \\
\therefore e_i = e_j &\leftrightarrow \frac{w_j}{w_i} = \frac{\text{VELT}_j}{\text{VELT}_i}
\end{aligned}
\tag{11}
$$

Therefore, unlike the implication of equation (7), equal rates of surplus value require more than equal wage rates. The relative wage rate must be equal to the relative value expression of labour time. This implies that sectoral rates of surplus value are equalized when the $\text{VELT}_i$'s are proportional to wage rates, $\text{VELT}_i = k w_i$ ($k$ is constant). In this special case, $e_i$ does not depend on any sector-specific element, as is clear from equation (12).

$$
e_i = \text{VELT}_i \left( \frac{m}{w_i} \right) - 1 = k w_i \left( \frac{m}{w_i} \right) - 1 = km - 1
\tag{12}
$$

Note in passing that the fact that the $\text{MEV}_i$ does not appear in equation (10) implies that sectoral differences in $\text{MEV}_i$'s will not make any difference in the estimates of sectoral rates of surplus value. If we compute the sectoral profit/wage ratio ($e_i^{\text{p}}$) as an 'inaccurate' proxy for the sectoral rate of surplus value, it is represented as

$$
e_i^{\text{p}} = \frac{m_i L_i - w_i L_i}{w_i L_i} = \frac{(\text{VELT}_i \cdot \text{MEV}_i) L_i - w_i L_i}{w_i L_i} = \text{VELT}_i \left( \frac{\text{MEV}_i}{w_i} \right) - 1
\tag{13}
$$

From equations (10) and (13), it becomes clear that the $\text{MEV}_i$ explains the difference between sectoral profit/wage ratio and sectoral rate of surplus value.

It is now possible to clarify the hidden conditions for the NI to be admissible on a sectoral level. First, as the distinction between socially necessary abstract labour and individual labour has been neglected in the NI literature, it finally amounts to assuming equal value expressions of labour time. Wage rate equalization, therefore, does not guarantee rate of surplus value equalization. Second, a remaining case for the NI is when value expressions of labour time are proportional to wage rates. This results in presupposing equal rates of surplus value at the outset. Foley's (2005) rationalization for the conventional NI procedure, therefore, makes sense only with the assumption of equal rates of surplus value.[17]

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[17] It would be interesting to note here that Keynes's concept of 'labour-unit' is also premised upon a similar assumption with the second case above:

## 4. CONCLUSION

The NI argues that Marxian value categories can be measured using price variables through the concept of MELT. Given that sectoral profit/wage ratio is an observable, albeit poor, measure for the degree of exploitation, estimating sectoral rates of surplus value requires us to examine two different issues: first, the distinction between produced and realized surplus value in a particular sector, and second, the quantitative connection between socially necessary abstract labour and concrete individual labour on a sectoral level. The NI abstracted from the second issue for analytical simplicity, or to put it differently, adopted a methodological hypothesis. This methodological attitude has also been supported by the NI's proposition that value–price connection should be considered only on an aggregate level.

This paper aimed to tackle above two issues simultaneously. In so doing, it was suggested that the MELT is decomposed into two concepts, 'value expression of labour time' and 'monetary expression of value'. As a result of this theoretically general consideration, the NI was critically examined regarding the problem of sectoral rates of surplus value and the following points were obtained:

(1) In order to avoid the indeterminacy, the NI must accept the proposition that sectoral value of labour power is defined by the ratio of money wage to the MELT.
(2) A consideration of decomposing monetary expression of labour time shows that sectoral rates of surplus value are sensitive to the magnitude of value expression of labour time.
(3) The NI's procedure can only be held if all the concrete labours are homogenized to the same amount of abstract labour and all the exploitative conditions are equalized across sectors.
(4) Developing a novel measure of sectoral rates of surplus value, therefore, leads to clarify and quantify the mechanism of determining value expression of labour time. This provides a new theoretical direction of the NI.

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. . . in so far as different grades and kinds of labour and salaried assistance enjoy a more or less fixed relative remuneration, the quantity of employment can be sufficiently defined for our purpose by taking an hour's employment of ordinary labour as our unit and *weighting an hour's employment of special labour in proportion to its remuneration*; i.e. an hour of special labour remunerated at double ordinary rates will count as two units. (Italic added: Keynes, 1973, p. 41)

This might contain a hint of a Keynesian origin of the NI with regard to the problem of aggregator, which was emphasized by Morishima (1973) as a common point between Marx and Keynes.

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