World Review of Political Economy Vol. 15 No. 2 Summer 2024 Pp. 231–260

Temporality and Stratification in the Transformation of Value into Price

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Abstract: This article aims to illuminate temporality in value determination and stratification of value and price in the transformation of value into price. This leads to an understanding of value-relocating through the two concepts presented in this study: current-value-relocating (CVR) and integrated-value-relocating (IVR). Based on Marx's exploration of the labor process and social reproduction and focusing on two components of a commodity's value and the relation between the individual and aggregate level, the article seeks to propose a non-linear conception of temporality in value determination, which justifies the application of simultaneous equations in value determination. Furthermore, through the depiction of the stratification of value and price, the study insists on retaining the relations among their components in different layers. Lastly, the research attempts to explain all price-value deviations at the aggregate and individual levels in two forms: CVR and IVR.

Key words: transformation of value into price; temporality; stratification; current-value-relocating; integrated-value-relocating

Submission date: 19 November 2023; **Revised date**: 27 December 2023; **Acceptance date**: 13 January 2024; **Publication date**: 12 July 2024

DOI:10.13169/worlrevipoliecon.15.2.0231

1. Introduction

Von Bortkiewicz's work (1975), which addressed the transformation of value prices into production prices, created a known transformation problem (TP). This problem led to the expansion of Von Bortkiewicz's initial three-fold economy model into a multi-fold subdivision of the economy. Moreover, it evolved from being solely based on commodity prices to incorporating the physical quantities of commodities. However, this expansion raised questions about the justifiability and necessity of certain assumptions made by Von Bortkiewicz, as evidenced by the works of Winternitz (1948), May (1948, 1949), Meek (1956), and Seton (1957).

After Sraffa's groundbreaking work (1960) and the ensuing explorations of the TP, critical challenges emerged against the labor theory of value (LTV) from both the right, exemplified by Samuelson (1971), and the left, represented by Steedman (1977). It was during this period that, in addition to offering a solution, attempts were made not only to explain the unexpected results of the transformation, as discussed by Shaikh (1977, 1984, 2016), but also to address the inadequacy of neo-Ricardian formulations (Shaikh 1981, 1982). Alongside efforts to explain unexpected results by focusing on the circuit of capital and capitalist revenue, other endeavors aimed to offer new interpretations of key LTV concepts, thereby significantly altering the transformation itself and its outcomes (Duménil 1983; Foley 1982). These attempts, which are known as New Interpretation (NI), led to a reevaluation of assumptions, which helped to clarify their connection to the outcomes of the transformation (Lipietz 1982; Glick and Ehrbar 1987).

In addition, another type of methodological exploration emerged, along with NI, but with a significant departure from it. This new approach strives to erase the TP altogether. Although responding to the TP was removed from the agenda, the qualitative relationship between value and price in Single-System interpretations (such as Rethinking Marxism by Wolff, Roberts, and Callari [1982] and Macro-Monetary by Moseley [2016][1]), on the one hand, and the corresponding importance of temporality in interpretations known as Temporal Single-System (by Kliman and McGlone [1988] and McGlone and Kliman [1996]), on the other hand, are located at the center of investigation.

Regardless of the authenticity of the interpretation itself, all of these approaches contributed unique insights into LTV, offering valuable perspectives. In light of these considerations, this article proposes a precise application of temporality and stratification in understanding the transformation of value into price.

In Section 2, we argue that using simultaneous equations does not contradict Marx's concept of value. We explore the labor process (Section 2.1) and social

reproduction (Section 2.2) while introducing a specific form of temporality (Section 2.3). Shaikh (1981, 1982, 1984) criticized neo-Ricardians for neglecting the labor process, but by focusing on this process in addition to re-structuring Von Bortkiewicz's example, we uncover an implicit temporality in the logic of value transfer from means of production to the final product (Section 2.1). NI directs our focus toward the critical issues of reproduction and the differentiation between categories at both the aggregate and individual levels. It accomplishes this not by altering the fundamental concepts of LTV but by emphasizing the significance of the net and gross product in view of aggregate capital. By referencing Marx's work, we highlight the determinant role played by the aggregate in solving problems at the individual level (Section 2.2). In the final part of this section, we discuss the implications of value determination in the context of social reproduction and its connection to temporality. The concluding observation of this section (Section 2.3) affirms that, unlike sequential interpretations such as Temporal Single-System and Macro-Monetary, simultaneous interpretations align with the logic of value transformation in the determination of value and price. Consequently, we put forward a novel theoretical rationale for using simultaneous interpretations, including Rethinking Marxism and standard interpretations.

After the justification of employing simultaneous equations in Section 2, Section 3 argues that the transformation of value into price involves one layered system rather than two separate systems. We delineate the stratification of value and price based on various levels of abstraction, asserting that the relationships between categories within each level and between different levels remain consistent when ascending from abstract levels to more concrete levels. As a result, it is demonstrated that we are not confronted with two distinct systems, which raises the question of selecting a specific normalization to link these systems (as is the situation in standard interpretations), nor are we faced with one non-layered system (as is the situation in Single-System interpretations).

In Section 4, we delve into the logic of the quantitative transformation of value prices into the prices of production (Section 4.1). Building on the stratification of value and price (Section 3) and considering non-linear temporality (Section 2), we argue for the division of the value-price deviation into current and integrated parts, referred to as current-value-relocating (CVR) and integrated-value-relocating (IVR), respectively. We show that the relationship between CVR and IVR aligns with the proposed temporality in Section 2. Consequently, all value-price deviations at the individual and aggregate levels in the superficial layer are consistent with the determination of value in the beneath layers. Finally, we discuss the relevance of other interpretations to the concepts presented in this article.

2. Temporality in Value Determination

2.1. Labor Process

Regardless of the specific social formation in which it occurs, the labor process serves as the general base of production. Therefore, exploration of the labor process sheds light on the general character of production, which takes shape in various forms across different contexts. Labor, fundamentally a relationship between humans and nature, is a deliberate and purposeful endeavor aimed at satisfying human wants. While the highest organisms in the organic world, such as animals, do alter the inorganic world, their actions lack intention and teleological positing. It is this distinction that characterizes humans' exclusive labor and, as Marx aptly put it, "distinguishes the worst architect from the best of bee" (Marx 2010a, 188; Lukacs 1980, 1–46).

This purposive activity, combined with the instruments and the subject of work, forms the elementary factors of the labor process. The interaction of these three elements results in the creation of use-value. From the viewpoint of use-value, the instruments and the subject of work are seen as means of production, while purposive activity is recognized as productive labor (Marx 2010a, 191). Hence, labor, characterized as purposive productive activity, stands as the general base of production.

If the use-value is not only the result of labor but also a condition of labor within the labor process, then this product is a use-value that sustains and realizes its character as a use-value in contact with living labor. Consequently, during the labor process, the use-value is consumed—or, more precisely, *productively* consumed (Marx 2010a, 193).

The analysis proceeds from the general toward the particular level. Since commodities are the unity of use-value and value, producing a commodity, which, like any production process, is a labor process, is also value-creating. In commodity production, labor acquires a two-fold character—concrete and abstract. Although purposive productive labor retains its general characteristics—which are from the viewpoint of use-value, it acquires new characteristics in the value-creating process—which are from the viewpoint of value. Abstract labor pertains exclusively to this specific social formation, while concrete labor, which represents the general character of labor, adopts dual characteristics within this particular framework.

From the viewpoint of use-value, productive consumption of means of production by concrete labor deconstructs each use-value, only to recreate it in a new form. However, from the viewpoint of value, productive consumption of means of production neither deconstructs the value of means of production nor recreates any new value. The creation of new value is associated with abstract labor. Instead, from the viewpoint of value, this productive consumption by concrete labor transfers the value of the means of production. But how?

To illustrate the relationship between the value of the means of production and the commodity's value, Marx considers the necessary sequence of labor processes for producing the product, means of production, means of production of means of production, and so on, as a single labor process. He suggests that "all the special processes carried on at various times and in different places, which were necessary . . . may together be looked on as different and successive phases of one and the same process" (Marx 2010a, 198).

In this proposition, purposive productive labor extends from the onset of the labor process toward the past perfect. It is important to note that every purposive productive activity itself has a duration, but throughout this entire process, it is considered a unified activity and essentially functions as such in reality. The purposive character of the labor process establishes this unity. At any point in the labor process, if this purposiveness disappears, the entire process devolves into a series of irrelevant and non-useful practices. The purposiveness of the labor process is what "gives the law to his modus operandi" (Marx 2010a, 188) and brings the labor process, from the beginning to the end, into a unified form.

Similarly, labor, in its aspect as useful labor within commodity production, can unite the labor process of producing a commodity with that of producing means of production. Therefore, the purposive character of labor, referred to as useful labor in commodity production, realizes the extension of the labor process to the past perfect. In this way, labor, through its usefulness in commodity production, transfers value from the means of production to the final product.

It is worth mentioning that "the whole of the labor in the yarn [or any commodity] is past labor" (Marx 2010a, 198). Thus, there is no difference between labor done at the onset and the end of the extended labor process. In other words, there is no difference between labor done in the *present perfect*—i.e., labor expended during the labor process of producing a commodity—and that which is done in the *past perfect*—i.e., labor expended in the labor process of producing means of production. Useful labor renders the labor process a *united past*.[2]

Extending the labor process into the past perfect and creating a unified past through useful labor holds meaning solely from the viewpoint of value. It is value and the value-creating substance that make this extension possible. Abstract labor is a characteristic of labor that exhibits qualitative uniformity across all purposive productive activities, with differences primarily being quantitative. Due to this identical substance, useful labor can transfer value from the means of production to the product. As Marx notes, "If these labors, despite different useful forms, did not have an identical essence, could not constitute the total labor that is realized in commodity, regardless of their qualities" (Marx 1969, 190).

In essence, abstract labor both creates value and makes its transfer possible. Useful labor is the agent of value-transferring, which realizes this possibility.

Abstract labor makes the possibility of unity, and useful labor actualizes this unity. Consequently, *the logic of value transfer involves extending the labor process and establishing a unified past*. Therefore, there is no distinction between the labor time expended in producing means of production and the labor time in the production process itself. Any differentiation between these two is incongruent with the logic of value transfer.

It is crucial to emphasize that we have not yet discussed the specific quantity of this transferred value. As we are aware, in determining the quantity of a product's value at the individual level or in the capital in general, we consider the quantity of transferred value—insofar as it is created value—as given. In the subsequent subsections, we will explore how determining this quantity is possible at the aggregate level and within the context of social reproduction, all in accordance with this underlying logic.

2.2. Social Reproduction

Reproduction involves the circular movement of value-capital as it transitions through three distinct forms: commodity capital (CC'), productive capital (PC), and money capital (MC). Beginning with each form as a point of departure bestows specific characteristics upon the circuit. The MC circuit encompasses productive consumption and capital movement, thereby expressing the self-expansion of capital. The PC circuit, in addition to productive consumption, incorporates non-productive consumption and the movement of revenue, thereby signifying the scale of capital reproduction.

The CC' circuit (C' – M' – C . . . P . . . C') includes both productive and non-productive consumption. It also involves self-expanding capital, which refers to the combination of capital and surplus value at the beginning of the circuit. This characteristic, coupled with the significance of material form, makes this circuit particularly suitable for tracking social reproduction.

In the analysis of individual industrial capital movement, the material form of the product may seem inconsequential. However, as Marx argued, a "merely formal manner of presentation is no longer adequate in the study of the total social capital and the value of its products" (Marx 2010b, 393). Therefore, one should consider not only the values but also their use-values, i.e., their material forms. That is why this circuit:

> . . . clamours to be considered not only as the *general* form of the circuit, i.e., not only as a social form in which every single industrial capital (except when first invested) can be studied, hence not merely as a form of movement common to all individual industrial capitals, but simultaneously also as a form of movement of the sum of the individual capitals, consequently of the aggregate capital of the

> capitalist class, a movement in which that of each individual industrial capital appears as only a partial movement which intermingles with the other movements and is necessitated by them. (Marx 2010b, 102–103; italics in the original)

The implications of this circuit differ when viewed from the perspective of individual industrial capital movements compared to the movement of aggregate social capital. To illustrate this distinction, we can examine *the representation of the components of the value of the product by corresponding proportional parts of the product itself*. It is known that the total product of any individual capital can be divided into components, each representing a distinct part of the product's value that differs functionally from others. In other words, a portion of an individual capital's product can materially represent constant capital—a transferred value—while another part can represent the value of variable capital and surplus value—newly created value (Marx 2010a, 230–233). However, when considering aggregate social capital, the perspective changes.

Consider dividing the annual product of a society undergoing simple reproduction into means of production and articles of consumption. As a result, the total value of the first part becomes divided into three components. One part represents the value of the means of production used in their creation, another represents the capital invested in labor-power, and the third represents surplus value.

Some of these commodities, which represent the value of constant capital from the perspective of individual capital, also represent society's constant capital from the viewpoint of social capital. However, the portion that, from the standpoint of individual capital, represents the value of variable capital and surplus value is seen as the representation of constant capital from the perspective of social capital. This is because, when viewed through the lens of social capital, the entire branch of means of production is engaged in the reproduction of the means of production used in production.

On the other hand, the total value of the branch producing consumption commodities undergoes a similar differentiation between individual capital and social capital but in reverse order. The portion of these commodities that represents the value of advanced constant capital, from the perspective of individual capital, is nothing more than the representation of the value of variable capital and surplus value from the viewpoint of social capital. In this context, the useful form of the product plays a significant role in determining its value representation.

> Although the social capital is only equal to the sum of the individual capitals, and for this reason the annual commodity product (or commodity capital) of society is equal to the sum of commodity products of these individual capitals; and although therefore the analysis of the value of the commodities into its

> component parts, valid for every individual commodity capital, must also be valid for the commodity capital of all society—and actually proves valid in the end—the form of appearance which these component parts assume in the aggregate social process of reproduction is different. (Marx 2010b, 367)

That is why the CC' circuit can reveal the distinction between the individual and aggregate levels.

> since C may exist in a use form which cannot enter any more into any process of production, it is indicated at the outset that the various value constituents of C, expressed by parts of the product, must occupy a different position, according to whether C' . . . C' is regarded as the form of the movement of the total social capital or as the independent movement of an individual industrial capital. (Marx 2010b, 104)

In the context of the CC' circuit, as observed from the standpoint of individual capital, we can see the movement of both social capital (production fund) and social revenue (consumption fund). However, when examined from the perspective of social capital, this can be either a comprehensive representation of the social capital's movement or that of social revenue, contingent upon their specific use-values. Particularly in the case of simple reproduction, where the equilibrium between the sum of variable capital and surplus value in the branch producing means of production matches the constant capital in the branch producing consumption commodities, social capital's viewpoint identifies the total product of the latter branch as the consumption fund and the total product of the former branch as the production fund. This differs from the breakdowns seen from the vantage point of individual capitals, where each branch represents both its capital and revenue. Thus, in the realm of simple reproduction, the total annual product is the result of a year's worth of productive labor. However, it is the product of the second branch that encapsulates the total annual value created, while the first branch embodies the total transferred value.

Now, based on the differentiation between the individual and aggregate levels as depicted in the CC' circuit and based on the value transfer logic, we can proceed to explain how to determine the quantity of value using simultaneous equations. This will be the main topic in the upcoming subsection, where we will examine Von Bortkiewicz's illustration.

2.3. Determination of the Quantity of Value

In the process of determining the value of a product within a specific branch, we have assumed the creation of transferred value and its associated production conditions inevitably as given. This assumption is unrelated to the logic of value

transfer, which stems from the extension of the labor process across a *united past*. When we treat the production of means of production as different and sequential stages within the same labor process, it becomes possible to discern and calculate the transferred value. However, when focusing solely on an individual branch, the extension of the labor process is not readily evident. This issue is resolved by considering social products as a whole. In the words of Marx, "the movement [of social capital] simultaneously solves problems the solution of which must be assumed when studying the circuit of a separate, individual capital instead of being the result of such study" (Marx 2010b, 103).

As evident from the preceding discussion, in simple reproduction, the branch producing means of production represents the production fund, encompassing the total transferred value. In contrast, the remaining branches represent the created value. Consequently, determining what may be perceived as given data when analyzed from the perspective of an individual branch becomes feasible when viewed at the aggregate level. This is because the branch of means of production holds the key to determining the entire transferred value. Hence, there is no necessity to assume the transferred value as given data when calculating the total value of social products.

However, complexity emerges. When attempting to ascertain the total transferred value through the branch of means of production, one encounters an individual branch whose value is subdivided into created and transferred components, with the latter being treated as a given. Upon closer examination, it becomes evident that the same principle does not apply to the means of production branch. In this specific branch, every input, to the extent that it is part of the product, is contingent and determined not by other branches but by the very branch. Consequently, in this branch, just as on the level of society's overall production, the premise is posited by the result.

To address this issue, we will reconstruct Von Bortkiewicz's example in a manner that allows us to simultaneously trace the labor process and observe the reproduction of social capital within the circuit of CC'. In Scheme 1, we denote C for means of production, V and S for consumption commodities of the workers and capitalists, respectively, N for the number of employees, and h for the hours of work. For instance, in Branch I, nine units of means of production are consumed over a labor process lasting 150 hours, resulting in the production of 15 units of new means of production.

Scheme 1. Von Bortkiewicz's Example

I. 9C + 10N * 15h = 15C
II. 4C + 13.3N * 15h = 30V
III. 2C + 10N * 15h = 10S

Calculating the value of Branch I provides us with the total transferred value. The transferred value within this branch is contingent upon the branch's own created value. In simpler terms, the specific social conditions in Branch I serve as the sole determinant of the value of the branch's products. These conditions determine the created value, as well as the overall generation of transferred value. We can represent this relationship algebraically for any unit product as follows:[3]

$$\frac{9}{15}\cdot\lambda_C+10=\lambda_C \rightarrow \frac{9}{15}\left(\frac{9}{15}\cdot\lambda_C+10\right)+10=\lambda_C$$

Clearly, the transferred value is the sum of the created and transferred value. The same principle applies to the subsequent transferred value, forming an unending sequence. In Equation (1), we have illustrated this sequence algebraically.

$$\left(\frac{9}{15}\right)^{\infty}\lambda_C+\left(\sum_{t=2}^{\infty}\left(\frac{9}{15}\right)^{t-1}\right)\cdot 10+10=\lambda_C \rightarrow \left(\sum_{t=2}^{\infty}\left(\frac{9}{15}\right)^{t-1}\right)\cdot \mathrm{CV}=\mathrm{TV} \qquad (1)$$

Consequently, the value of any unit within this branch is 25, which is further divided into created and transferred values (CV and TV), accounting for 10 and 15, respectively. It is important to note that the latter is contingent upon the former. The recursive solution, as depicted in Equation (1), shows that live labor or created value determines dead labor or transferred value according to the production conditions of the branch producing means of production. The simplified solution of the equation would mask this crucial relationship. By ascertaining the product value of this branch, we can unveil the total transferred value. This enables us to determine the product values of other branches based on their respective contributions. Moreover, we can assess the total created value by considering the combined product values of the second and third branches. In this manner, we ultimately reveal the value of individual branch products as well as the overall value of products of society as a whole.

Expanding Von Bortkiewicz's example to an economy with multiple sectors does not alter the previous propositions. This is because the total social product and, consequently, the entire production process can still be divided into subprocesses. As Marx elucidates, "All the various branches of production pertaining to each of these two departments form one single great branch of production" (Marx 2010b, 394). When we consider all production branches related to means of production as a unified sector, we can represent the labor process and the production of means of production using Formula (I):[4]

$$\boldsymbol{\lambda}_{mp}\cdot\mathbf{A}_{mp}+\mathbf{N}_{mp}\cdot h=\lambda_{mp}\cdot\mathbf{X}_{mp} \qquad (I)$$

Solving Formula (I) can be accomplished using the same logic employed to solve Equation (1) in Von Bortkiewicz's example. In practical terms, this system applies the existing social conditions of living labor to determine the dead labor in the means of production branch. By calculating the total transferred value in Formula (I) and allocating it to the respective subbranches producing consumption commodities based on their shares, we can readily determine the value of consumption products.

$$\boldsymbol{\lambda}_{mp} \cdot \mathbf{A}_{ac} + \mathbf{N}_{ac} \cdot h = \boldsymbol{\lambda}_{ac} \cdot \mathbf{X}_{ac} \quad \text{(II)}$$

From our perspective,[5] this conception of temporality is the only accurate way to understand the value concept as Marx originally expounded. Viewing value as a social relation of production dismisses two types of temporality in value explanations. The first is the *backward* temporality evident in Smith's value explanation. This approach, which considers the real price of a commodity (the price in labor, to use Smith's terms) as the quantity of labor or commodity it commands, inevitably associates the value of a commodity with the future—what it will become. The second type of temporality, a *forward* temporality, is found in Ricardo's work. The perspective that perceives value as the labor embodied in a commodity invariably characterizes value as something material, latent within the commodity, and unchangingly moving from the past to the future.

In our view, providing an interpretation consistent with socially necessary embodied labor does neither assume value as a material entity within the commodity, shifting from the past to the future, nor something that will solely establish itself in the future. Value as a social relation of production posits the past in the context of present conditions, that is, living labor in the production process simultaneously creating the value of the commodity and establishing the assumptions of the production process itself, i.e., transferred value. Value, not as a natural quality of an article that enters a process related to non-human nature but as a social attribute, becomes a part of the process that constructs this very attribute. In this process, the production process, value is genuinely constructed. In other words, value neither travels from the past to the present nor is its current existence dependent on realization in the future. Instead, within the production process, any semi-material that already exists is re-determined in light of the social relation of production that gives it shape. As long as these established social conditions remain unaltered, this re-determination endures even if it is not realized and gets lost.

Combining Formulas (I) and (II) yields the familiar system of simultaneous equations. However, it is important to note that the preceding discussion provides theoretical justification for their use, with a particular emphasis on the distinct attributes of created and transferred value, especially the integrated nature of transferred value, which we will utilize in the fourth section.

3. Stratification of Value and Its Money Form

The distinction between the "outward appearance" and "essence of things" serves as the source for scientific inquiry (Marx 2010c, 804). Essence, in conjunction with phenomena, constitutes the "concrete totality." In other words, reality is the unity of phenomena and essence. Consequently, science strives to identify the mediators through which phenomena conceal and reveal the essence. It then seeks to intellectually reproduce this reality across all levels and dimensions (Kosik 1976, 1–16).

Building upon this insight, we aim to illustrate that the price of production, as the sum of the cost price and profit, presents a "chaotic conception" within the phenomenal world. To elucidate its components, we must establish its relationship with the value price as a "simple concept" or a "thinner abstract." This enables us to grasp "reality as a rich totality of many determinations and relations" (Marx 2010d, 37–45). The structure of exposition and theory for articulating these (chaotic and simple) concepts and comprehending the concrete totality is layered. Each layer signifies a level of abstraction that elucidates specific determinations and facilitates the transition to a more concrete level of analysis. It is essential to note that the relations established at the abstract levels are retained as we delve into the more concrete levels.

Price is the money form of value, serving as the monetary expression of abstract labor time, whether it pertains to the value price or the price of production. In essence, there is no difference between the substance of the value price and the price of production, which is abstract labor. However, a notable distinction lies in the quantity of the latter, which Marx argues undergoes systematic deviations. To transition from the former to the latter, a two-step progression is necessary, moving from the abstract levels of "commodity production" to "capitalist commodity production" and from "capital in general" to "many capitals" (Rosdolsky, Bathrick, and Rabinbach 1974, 65–70).

During each of these steps, the unraveling of an enigma within classical economics occurs. Throughout this transition, it is imperative to retain not only the relationships between categories at each level but also the connections between different levels.

3.1. From Commodity Production to Capitalist Production

Describing the creation process and determination of value, as discussed in the previous section, remains relevant whether labor is waged or not. However, by situating a specific form of labor within a capitalist society, namely, waged labor, the framework gains concreteness. Waged labor appears in the form of *payment for labor*. By revealing the essence of this phenomenon, Marx resolved the first classical economics enigma.

In classical literature, influenced by the Physiocrats, it was assumed that the compensation for waged labor equated to the necessary means for the working family's reproduction. Marx, in his examination of labor-power as a commodity, accentuated both its similarities with and distinctions from other commodities and provided a precise definition. He stated, "The value of labour power is determined, as in the case of every other commodity, by the labour time necessary for the production, and consequently also the reproduction, of this special article." The production and reproduction of labor-power involve its maintenance and intergenerational replacement on a societal scale with peculiar qualities. These requirements are shaped by the social and historical conditions of the working class, which vary across time and space. Therefore, "in contradistinction therefore to the case of other commodities, there enters into the determination of the value of labour power a historical and moral element." But here lies the point that "nevertheless, in a given country, at a given period, the average quantity of the means of subsistence necessary for the labourer is practically known" (Marx 2010a, 180–181).

The exchange-value of the labor-power commodity, likewise any other commodity, represents the crystallization of labor, while its use-value embodies the potential for the accomplishing of labor, purposive productive activity. The disparity between these aspects serves as the key to unraveling the enigma of accumulation in classical economics, as revealed by Marx's analysis of the commodification of labor-power as the defining feature of capitalism.

When considering labor-power as a commodity or labor in the specific form of waged labor and transitioning from the general level of simple commodity production to the particular level of capitalist commodity production, the preconditions of the labor process become constant and variable capital.

Constant capital maintains its original characteristics and is not newly produced or truly reproduced. Its transfer only *appears* to be a reproduction. On the other hand, variable capital is genuinely reproduced, as Marx notes, "The substitution of one value for another, is here effected by the creation of new value" (Marx 2010a, 218).

The moment workers receive compensation for their labor, the exchange-value of their labor-power is realized. Subsequently, this compensation is used to purchase consumption commodities, which allows worker reproduction. On the other hand, the use-value of labor-power is realized during the labor process. If the value creation process goes beyond a certain point, the value produced exceeds the value of labor-power. This results in the creation of value, which is divided into two parts: one covers the advanced value of labor-power, while the other constitutes surplus value. Unlike constant capital, both reproduced value and surplus value originate from newly created values in the production process.

Table 1. The Representation of the Components of the Value of the Product by Parts of the Product Itself at the Individual and Aggregate Levels

Branches		*Capital*	*Revenue*		*Individual*	
		Constant capital	*Variable capital*	*Surplus value*	*Value*	*Aggregate*
I	product	9	3.6	2.4	15	Capital
	value	225	90	60	375	
II	product	10	12	8	30	Revenue
	value	100	120	80	300	
III	product	2.5	4.5	3	10	
	value	50	90	60	200	

By proceeding from commodity production to capitalist commodity production, the value of a commodity converts from the sum of created and transferred value into the sum of constant and variable capital and surplus value. The appearance of these two parts of value in these three categories provides the basis for their concealment behind the categories of cost price and profit. We will delve into this phenomenon in the next subsection. However, before we proceed, let's address Von Bortkiewicz's example within the second level of analysis.

We assume that the average necessary commodity bundles amount to 0.9 units of the product from the second branch ($0.9\lambda_V = \lambda_L$). The distinction between the individual and aggregate levels allows us to represent various components of a product's value through corresponding proportional parts of the product itself, as illustrated in Table 1.

From the viewpoint of social capital, constant capital is not embodied in the commodity bundle composed of 9, 10, and 2.5 units of commodities from Branches I, II, and III, respectively. Instead, it is reflected in the total output of the first branch. The same is true for the variable capital and surplus value of total social capital represented as the total income in the sum of products of Branches II and III—i.e., branches producing consumption commodities.

As a result, the transferred value takes the form of 15 units of the material commodity produced by Branch I. The created value, which amounts to 500 units, is divided into two parts. The paid portion is manifested as 30 units of the material commodity (Branch II), representing the consumption commodity for workers. On the other hand, the unpaid portion is presented as ten units of the consumption commodity for capitalists (Branch III).

Figure 1 illustrates the circular movement of individual capitals in circuit CC'. This form of representation will be useful in the upcoming sector to demonstrate various types of value transfers distinctly.

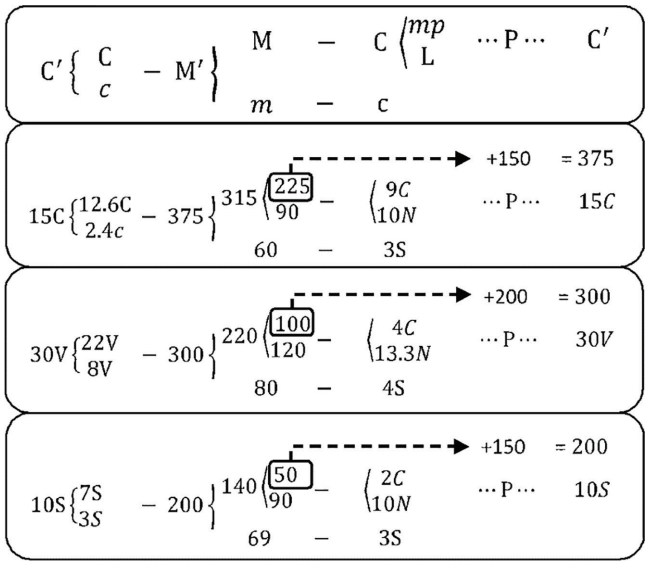

Figure 1. Circuit of CC' Based on Value Relation

In the individual production branches within Von Bortkiewicz's expanded example, the constant capital for branches producing means of production is given by $\boldsymbol{\lambda}_{mp} \cdot \mathbf{A}_{mp}$, while for branches producing consumption commodities, it is $\boldsymbol{\lambda}_{mp} \cdot \mathbf{A}_{ac}$. Given the value of labor-power,[6] $\boldsymbol{\lambda}_{ac} \cdot \mathbf{Wr}^{T}$, variable capital in these branches can be expressed as $\boldsymbol{\lambda}_{ac} \cdot \mathbf{Wr}^{T} \cdot \mathbf{N}_{mp}$ and $\boldsymbol{\lambda}_{ac} \cdot \mathbf{Wr}^{T} \cdot \mathbf{N}_{ac}$ for means of production and consumption commodities, respectively. The surplus value in the same order is $\mathbf{N}_{mp} \cdot \mathbf{h} - \boldsymbol{\lambda}_{ac} \cdot \mathbf{Wr}^{T} \cdot \mathbf{N}_{mp}$ and $\boldsymbol{\lambda}_{ac} \cdot \mathbf{Wr}^{T} \cdot \mathbf{N}_{ac}$.

At the social capital level, the representation of constant capital is $\boldsymbol{\lambda}_{mp} \cdot \mathbf{X}_{mp}$, and the sum of surplus value and variable capital, equivalent to the total income, is represented by $\boldsymbol{\lambda}_{ac} \cdot \mathbf{X}_{ac}$. The surplus value is given by $\boldsymbol{\lambda}_{ac} \cdot \mathbf{X}_{ac} - \boldsymbol{\lambda}_{ac} \cdot \mathbf{Wr}^{T} \mathbf{N}$.

3.2. From Capital in General to Many Capitals

From a capitalist's perspective, the expenses incurred for production equate to the sum of the cost of the means of production consumed and the cost of labor compensation. However, the actual cost of production encompasses the means of production consumed and the labor-power itself, which creates value during working hours. The portion of a commodity's value that replaces the capital invested in production is termed the cost price. This determination of the cost price occurs within the production process itself, as it must continuously shift from the

commodity form to the money form and then back to the productive form to initiate the process anew.

Nevertheless, grouping two fundamentally distinct components of a commodity's value under a single economic category obscures their divergent natures and transforms the commodity's value from a summation of constant capital, variable capital, and surplus value into the sum of cost price and surplus value. When these two categories, constant and variable capital, recede into the background, and the cost price assumes their role, certain previously clear distinctions become murky.

First, a change in variable capital has no impact on the commodity's value, whereas a change in constant capital does. Consequently, a modification in the cost price partly alters a commodity's value and partly does not.

Second, the capital expended on the acquisition of means of production, which falls under the category of constant capital, directly enters and exits in the production process without undergoing any quantitative changes. In contrast, the capital spent on labor-power does not constitute an element of the capital actively involved in production; instead, it is the living labor itself that enters the production process, replacing part of the advanced capital. The cost-price category also conceals these intricacies.

This qualitative change also results in a qualitative transformation of the remaining portion of the commodity's value. When the distinction between constant and variable capital becomes obscured within the cost-price category, the surplus value, which, along with variable capital, constitutes the created value, loses its connection with variable capital. Consequently, what remains is not an unpaid portion of the created value but rather the residual part of the commodity's value after deducting the cost price. This phenomenon is commonly recognized as profit. While surplus value is related to and proportionate to the variable capital, profit is tied to and proportionate to the cost price. As Marx stated, "In its assumed capacity of offspring of the aggregate advanced capital, surplus value takes the converted form of profit" (Marx 2010c, 40). Therefore, the commodity's value, which may initially appear in a mystified form at the superficial level, must always be viewed in relation to its underlying yet more substantive layers.

In the following section, we contend that the amnesia of this stratification leads to significant complications in comprehending the quantitative changes that transpire at the third level.

4. Value-Relocating in Quantitative Transformation

Ensuring an equal rate of exploitation across various branches of production by standardizing the working day and the value of labor-power among them results in surplus value being directly proportional solely to the advanced variable capital. However, as Marx observes, "this law clearly contradicts all experience based on

appearance . . . For the solution of this apparent contradiction, many intermediate terms are as yet wanted" (Marx 2010a, 311).

The key intermediate term for resolving this apparent contradiction lies in the qualitative conversion of the sum of constant and variable capital, treated as advanced capital, into the cost price. Consequently, this conversion also transforms surplus value into profit. This understanding is predicated on the stratification of value and price as discussed in the previous section.

The subsequent intermediate term involves the quantitative transformation of price components, facilitated by the quantitative conversion of surplus value into profit, which we shall now address. In this context, we must consider that any quantitative alteration in the price components should not disrupt the relationships among them in the underlying layers. Specifically, two aspects merit attention. On one hand, the relationship between created value and transferred value must align with our previous explanation in the underlying layers. On the other hand, the effect of changes in the cost price depends on which of elements at the underlying layers it is associated with, as this variation has distinct implications for the price of production.

4.1. Explaining the Logic of Conversion

The qualitative conversion of the categories mentioned, namely, constant and variable capital into the cost price and surplus value into profit, is paralleled by the transformation of the rate of surplus value into the rate of profit. It becomes evident that when surplus value is directly proportional to variable capital, individual branches of production do not generally share a common rate of profit. This disparity arises from the fact that the ratio of their variable capital to constant capital may not be uniform. Consequently, it appears that the notion of a uniform rate of profit across various branches of production, determined by competitive forces among capitals, may not align with the principles of LTV. This dilemma constitutes the second enigma within classical economics that Marx attempts to resolve.

Marx's solution involves considering the total social capital of the capitalist class as a single entity, referred to as "capital as total social capital." Concurrently, he examines individual branches of production as integral components of this collective capital. In one illustrative example, he treats "500 as a single capital, and capitals I to V merely as its component parts" (Marx 2010c, 154). From this perspective, it seems logical to distribute the total surplus value among different branches based on each one's share of the total capital, resembling the practices of a joint-stock company.

> So far as profits are concerned, the various capitalists are just so many stockholders in a stock company in which the shares of profit are uniformly divided per 100, so

> that profits differ in the case of the individual capitalists only in accordance with the amount of capital invested by each in the aggregate enterprise, i.e., according to his investment in social production as a whole, according to the number of his shares. (Marx 2010c, 157)

Consequently, the surplus value of each specific branch undergoes not only qualitative but also quantitative changes, resulting in a deviation of profit from its original surplus value. Within each branch, the surplus value represents the portion it contributes to the total surplus value, while profit signifies the portion that the branch claims from this aggregate surplus value. In this manner, one can elucidate the principle of the equalization of the general rate of profit within the framework of LTV.

It is worth mentioning that explaining the redistribution of total surplus value among capitals, considering them as belonging to the total capital, in proportion to advanced capitals, and not just variable capital, does not explain how it occurs in reality. Marx acknowledges competition as the explanation for this phenomenon, albeit beyond the scope of our present discussion.

Consequently, the competition that equalizes the profit rate also leads to *the redistribution of total surplus value among different branches of production in proportion to their share of advanced social capital*. This process enables us to formulate Formula (III) for the price of production.

$$\textit{Production price} = \textit{cost price} + (\textit{share of total advanced capital} * \textit{total surplus value}) \quad \text{(III)}$$

When extending Von Bortkiewicz's example to a multi-fold economy, it is important to note that the total transferred value is linked to the production conditions of the branch producing the means of production and is contingent upon those conditions. The created value, on the other hand, remains independent of the transferred value and solely depends on the working day's length. The division of created value is determined exclusively by the value of labor-power. Therefore, at the social level, surplus value constitutes only a portion of the created value and is contingent upon the value of the labor-power employed.

As a result, the cost price in individual branches, which equals the advanced capital used for acquiring labor-power and means of production, can be formulated as $\boldsymbol{\lambda} \cdot \mathbf{A} + \boldsymbol{\lambda} \cdot \mathbf{Wr}^{\mathrm{T}} \cdot \mathbf{N}$. The second component of the price of production, profit, comprises two elements. First, at the social capital level, and building on our previous discussions, surplus value can be represented as $(\mathbf{N} \cdot \mathrm{h} - \boldsymbol{\lambda} \cdot \mathbf{Wr}^{\mathrm{T}} \cdot \mathbf{N}) \cdot \mathbf{I}$. Overlooking the preceding points and treating the total surplus value as merely total value minus constant and variable capital neglects the distinction between created and transferred value, falling into the illusion of the phenomenon.

The second element, representing the share from the advanced capital, is equal to $\left(\lambda \cdot \mathbf{A} + \lambda \cdot \mathbf{W}\mathbf{r}^{\mathrm{T}} \cdot \mathbf{N}\right) * \frac{1}{\left(\lambda \cdot \mathbf{A} + \lambda \cdot \mathbf{W}\mathbf{r}^{\mathrm{T}} \cdot \mathbf{N}\right) \cdot \mathbf{I}} \cdot$

Thus, the initial estimation of the price of production can be formulated as shown in Formula (IV):

$$\mathbf{P} \cdot \mathbf{X} = \left(\lambda \cdot \mathbf{A} + \lambda \cdot \mathbf{W}\mathbf{r}^{\mathrm{T}} \cdot \mathbf{N}\right) + \frac{\left(\lambda \cdot \mathbf{A} + \lambda \cdot \mathbf{W}\mathbf{r}^{\mathrm{T}} \cdot \mathbf{N}\right)}{\left(\lambda \cdot \mathbf{A} + \lambda \cdot \mathbf{W}\mathbf{r}^{\mathrm{T}} \cdot \mathbf{N}\right) \cdot \mathbf{I}} * \left(\left(\mathbf{N} \cdot \mathrm{h} - \lambda \cdot \mathbf{W}\mathbf{r}^{\mathrm{T}} \cdot \mathbf{N}\right) \cdot \mathbf{I}\right) \quad \text{(IV)}$$

4.2. Current and Integrated Value-Relocating

Despite the assumptions made by Marx in his solution and the example presented by Von Bortkiewicz, the transformation of value into the price of production remains incomplete. The first thinker to highlight this was Marx. He states that "under capitalist production the elements of productive capital are, as a rule, bought on the market" (Marx 2010c, 159). Thus, advanced capital, which up to now was assumed to be a quantity based on value, now should be assumed based on the price of production.

However, this adjustment does not introduce any fundamentally new elements or alter the underlying logic of the transformation process. Still, value is transformed into the price of production because *competition redistributes surplus value as profit, proportionate to capital's share of the social capital*. Nevertheless, redistributing surplus value under this assumption brings about additional complexities.

Modifying the "original assumption concerning the determination of the cost price" (Marx 2010c, 164) necessitates the modification of both its components. The first component, which originally represented the value of means of production, is now equivalent to their price of production. The second component, initially linked to the value of the given commodities serving as the means of subsistence required for the reproduction of a certain amount of labor-power, now corresponds to their price of production. In transforming value into the price of production, it is not only profit that deviates quantitatively from surplus value, but the cost price also quantitatively deviates from the sum of the value of means of production and the given means of subsistence. It is worth noting that the deviation of the cost price itself is contingent upon the deviation of profit.

We must emphasize that this deviation does not nullify the inherent relationship among various components and the interplay between different layers of value. Just as the transition between the layers illustrated in Figure 2 does not obliterate these characteristic relationships and the dependencies between the

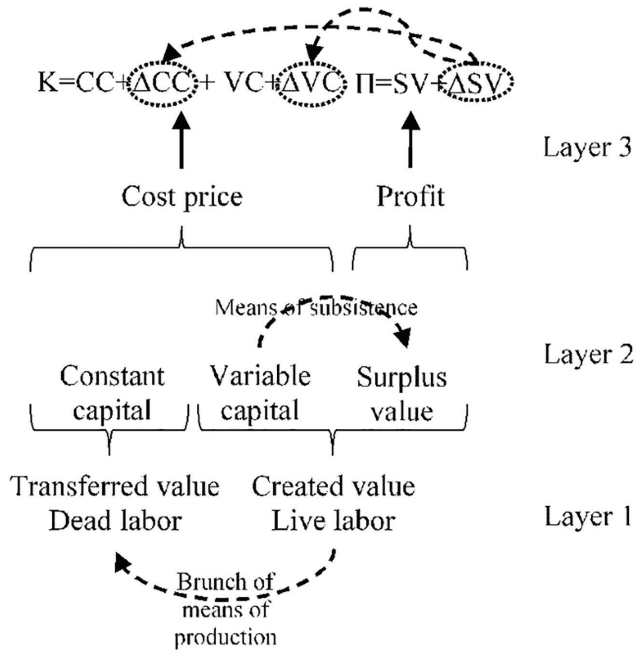

Figure 2. Stratification and Relations of Components of Value and Price

components of commodity value and the relationships among the layers, it merely obscures them. To provide further clarification, let us revisit our previous discussion and now illustrate this in Figure 2.

As demonstrated, living labor in the deepest layer not only generates the result but also posits its own precondition. In other words, the value created in the production process sets the preconditions of the production process itself, i.e., transferred value, through *the branch of means of production*. From our perspective, this temporal framework is the most accurate for comprehending value as a social relationship.

In the second layer, the created value is apportioned into variable capital and surplus value, based on the foundation of living labor and the resultant value and assuming *an average bundle of means of subsistence* for laborers.

In the outermost layer, the outward appearance of profit and cost price not only obscures the connection between living and dead labor but also conceals the relationship between surplus value and variable capital. This obscurity does not eradicate these connections but merely shrouds them. Even when surplus value is redistributed and the cost price deviates from its predetermined value, these relationships remain intact. Therefore, a comprehensive explanation of these deviations should be consistent with the intricate relations and stratification discussed.

Through the redistribution of total surplus value among different branches of production, both components of the price of production deviate from their counterparts within a commodity's value. Consequently, each unit of a commodity no longer solely represents the socially necessary labor hours required for its production but also incorporates the relocated value from all components of the commodity's value. To be precise, each element in any layer undergoes a process of value-relocating. We have illustrated these changes and their interrelationships in Figure 3, as explained below.

In the first layer, a commodity is represented as the sum of created value (CV) along with relocated created value, denoted as Δ_{CV}, and transferred value (TV) along with relocated transferred value, signified as Δ_{TV}. We refer to the relocation of created value as CVR and the relocation of transferred value as IVR. It is worth noting that CVR occurs after the production process, while IVR takes place before it.

In the second layer, a commodity embodies the sum of constant capital (CC), variable capital (VC), and surplus value (SV), each accompanied by its corresponding relocated values. Within this layer, the distinction between profit and surplus value is analogous to the concept of CVR mentioned in the previous layer. Similarly, the contrast between the price of production and the value of the means of production aligns with the IVR concept introduced in the initial layer. However, the discrepancy between the capital advanced to purchase labor-power, i.e., the difference between the value and price of production of an average bundle of means of subsistence, is not reflected in the commodity's value itself. As Figure 3 illustrates, this difference merely influences the proportion of paid and unpaid labor within the living labor or the created value.

In the third layer, due to these relocations, profit (π) and the cost price (k) deviate from surplus value and the sum of constant capital and variable capital. It is important to note that the cost-price deviation in this layer is not equivalent to the IVR. This is because the variable capital and its relocated value in the first layer represent a portion of the created value and do not directly impact the created value itself; instead, they influence its distribution. In the process of value creation, it is not the variable capital and its fluctuations that play a role but rather the role of living labor. Therefore, only

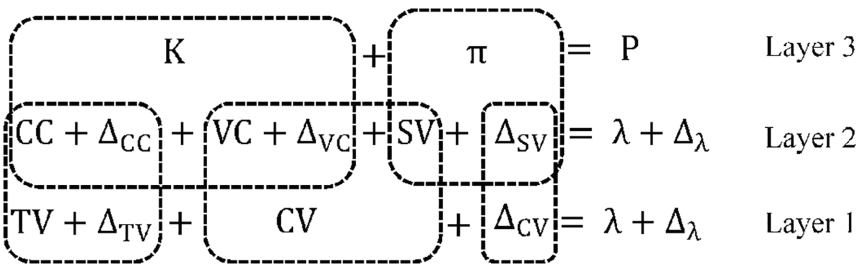

Figure 3. Stratification and Relations of Relocated Values in Individual Branch

a portion of the deviation in the cost price of commodities is reflected in the price of production of a commodity, the very portion equal to IVR.

Despite this modification to the assumption, the fundamental logic underpinning the transformation of value into price remains intact. Thus, we arrive at the following conclusion:

*Price of production = modified cost price + share of total advanced capital * total surplus value* (V)

When applying Formula (V) to Von Bortkiewicz's example, the process unfolds as follows:

$$15P_C = 9(\lambda_C + \Delta\lambda_C) + 10(\lambda_L + \Delta\lambda_L) + \left(\frac{9(\lambda_C + \Delta\lambda_C) + 10(\lambda_L + \Delta\lambda_L)}{15(\lambda_C + \Delta\lambda_C) + 33.3(\lambda_L + \Delta\lambda_L)}\right) *(33.3*15 - 30(\lambda_L + \Delta\lambda_L))$$

$$30P_V = 4(\lambda_C + \Delta\lambda_C) + 113.3(\lambda_L + \Delta\lambda_L) + \left(\frac{4(\lambda_C + \Delta\lambda_C) + 13.3(\lambda_L + \Delta\lambda_L)}{15(\lambda_C + \Delta\lambda_C) + 33.3(\lambda_L + \Delta\lambda_L)}\right) *(33.3*15 - 30(\lambda_L + \Delta\lambda_L))$$

$$10P_S = 2(\lambda_C + \Delta\lambda_C) + 10(\lambda_L + \Delta\lambda_L) + \left(\frac{2(\lambda_C + \Delta\lambda_C) + 10(\lambda_L + \Delta\lambda_L)}{15(\lambda_C + \Delta\lambda_C) + 33.3(\lambda_L + \Delta\lambda_L)}\right) *(33.3*15 - 30(\lambda_L + \Delta\lambda_L))$$

Through calculations, we determine that the price of the production vector equals [461.54, 367.69, 192.31], which translates to [30.77, 10.26, 19.23] per unit. In Figure 4, we provide a detailed representation of value-relocating within the layers of value and price determination, focusing on the first branch.

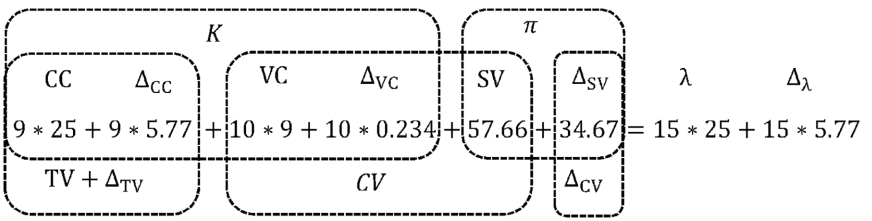

Figure 4. Stratification and Relations of Relocated Values in the First Branch of Von Bortkiewicz's Example

Considering all three layers to explain the value-relocation of each individual capital is essential. Let us focus on the first branch, depicted in Figure 4. With the formation of the price of production, the created value, which depends on the production process (i.e., the 15-hour workday of ten laborers), remains constant. However, its paid and unpaid components change due to adjusting the variable capital from $9\lambda_V$ to $9P_V$. As a result, the created value in the branch and the unit commodity remains at 150 and 10, respectively. However, the surplus value in the branch and the unit commodity decreases to 57.69 and 3.85, respectively. Also, we are dealing with constant capital, which comprises the value of the means of production and IVR that is equal to 3.46. This constant capital enters the production process and is transferred through concrete labor. Additionally, we deal with CVR, which is provided by relocating the surplus value from other branches after production and has a value of 2.31.

In the third layer, the price of production consists of two parts: the cost price and profit. The cost price for the branch and unit commodity is 369.23 and 24.62, respectively. The corresponding elements for profit are 92.31 and 6.15. However, the third layer does not provide insights into value-relocating, as it conceals the distinctions between variable and constant capital, as well as between created and transferred value. The modified cost price differs from the cost price, with a portion of this deviation being transferred to the commodity's value while the rest is not. Consequently, this discrepancy fails to offer any meaningful insight. Similarly, the distinction between profit and surplus value does not yield significant insights. Some of this divergence is due to changes in the surplus value within the branch itself, while the other part is the result of the relocation of surplus value between branches.

Table 2 presents a concise overview of how the relocation of values can be elucidated in the other branches, following a similar approach as previously outlined in the first branch.

Table 2. Relocated Values in Branches

Branch		*CC*	Δ_{cc}	*VC*	Δ_{vc}	*SV*	Δ_{sv}	λ	Δ_{λ}
I	Total product	225.00	51.92	90.00	2.31	57.69	34.62	375.00	86.54
	Unit product	15.00	3.46	6.00	0.15	3.85	2.31	25.00	5.77
II	Total product	100.00	23.08	120.00	3.08	76.92	–15.38	300.00	7.69
	Unit product	3.33	0.77	4.00	0.10	2.56	–0.51	10.00	0.26
III	Total product	50.00	11.54	90.00	2.31	57.69	–19.23	200.00	–7.69
	Unit product	5.00	1.15	9.00	0.23	5.77	–1.92	20.00	–0.77

Up to this point, we have argued that at the individual level, two types of value-relocating are at play: current and integrated. As Marx observed, the price of production deviates from value due to these two factors. He explained this deviation by stating,

> Deviation in prices of production from values arises from: 1) adding the average profit instead of the surplus value contained in a commodity to its cost price; 2) the price of production, which so deviates from the value of a commodity, entering into the cost price of other commodities as one of its elements. (Marx 2010c, 204)

Now, it is essential to examine the role of these two types at the aggregate level and how they should be explained. An explanation of value-relocating at the aggregate level necessarily involves all three layers.

As previously illustrated, living labor determines dead labor in the first layer. Similarly, in this context, CVR gives rise to IVR. More precisely, in Branch I, CVR posits its IVR, mirroring how its created value posits its transferred value. To algebraically illustrate the determination of IVR by CVR in Branch I, Equation (2) can be employed. This equation derives the relationship between IVR and CVR from the integrated nature of IVR—similar to the integrated nature of transferred value.

$$\frac{9}{15}\left(\lambda_c+\Delta\lambda_c\right)+10+\frac{\Delta s}{15}=\lambda_c+\Delta\lambda_c \rightarrow \frac{9}{15}\left(\frac{9}{15}\left(\lambda_c+\Delta\lambda_c\right)+10+\frac{\Delta s}{15}\right)+10+\frac{\Delta s}{15} = \lambda_c+\Delta\lambda_c$$

This leads to:

$$\left(\frac{9}{15}\right)^{\infty}\Delta\lambda_c+\left(\sum_{t=2}^{\infty}\left(\frac{9}{15}\right)^{t-1}\right)\cdot\frac{\Delta s}{15}+\frac{\Delta s}{15}=\Delta\lambda_c \rightarrow \left(\sum_{t=2}^{\infty}\left(\frac{9}{15}\right)^{t-1}\right)\cdot \mathrm{CVR} = \mathrm{IVR} \quad (2)$$

As mentioned earlier, from the standpoint of social capital, the total product of Branch I represents dead labor. Consequently, the total value-relocating of Branch I, the branch of production of means of production, determines IVR at the aggregate level. On the other hand, the total relocated value in the consumption commodities branch represents the total CVR, as the value of its commodities mirrors the total created value.

The CVRs of individual branches eventually cancel each other out, resulting in a net sum of zero. This is evident because CVR represents the redistribution of surplus value after the production process.

The portion of CVR that affects consumption commodities does not play a role in reproduction. Any value relocated toward these commodities, like their value, becomes irrelevant after consumption. Even when workers consume these commodities, they are not immediately involved in productive consumption. A key point is emphasized here: the commodities consumed by workers do not enter into the creation of value in the production process, but rather it is the living labor that accomplishes this.

The portion of CVR impacting means of production does not get nullified by consumption; it is transferred through useful labor and integrated into the final product. The values relocated to the means of production, which are subsequently transferred to the product by useful labor, explain the deviation between the sum of commodities value and the sum of their price of production based on the LTV.

As a result, after transforming the value price into the price of production due to the consideration of competition between capitals and through the redistribution of surplus value, there is no part of the price of production of commodities that does not represent abstract labor time. Part of it comprises necessary living labor for the direct production of the commodity, along with relocated value through surplus value redistribution after production. The other part consists of dead labor, transferred from the means of production through useful labor, and the relocated value from the surplus value redistribution, integrated into the final commodity. In the second layer, the relocated value, from the perspective of social capital, influences the division of created value into paid and unpaid portions. This influence depends on the price-value deviation of workers' means of subsistence, given a specific number of workers and working days. The total cost price and total profit in the third layer merely deface the picture.

Figure 5 illustrates the circular movement of individual capitals in circuit CC' after transforming value prices into the price of production. This representation, which includes the material form of the product at the beginning of the circuit, enables us to easily recognize and track the IVR. This is possible because the part of the product that transfers the relocated value to the new product is present from the circuit's outset.

By comparing Figure 1 with Figure 5, it becomes evident that, as Marx emphasized,

> The fact that prices diverge from values cannot, however, exert any influence on the movement of the social capital. On the whole, there is the same exchange of the same quantities of products, although the individual capitalists are involved in value relations no longer proportional to their respective advances and to the quantities of surplus values produced singly by every one of them. (Marx 2010b, 392)

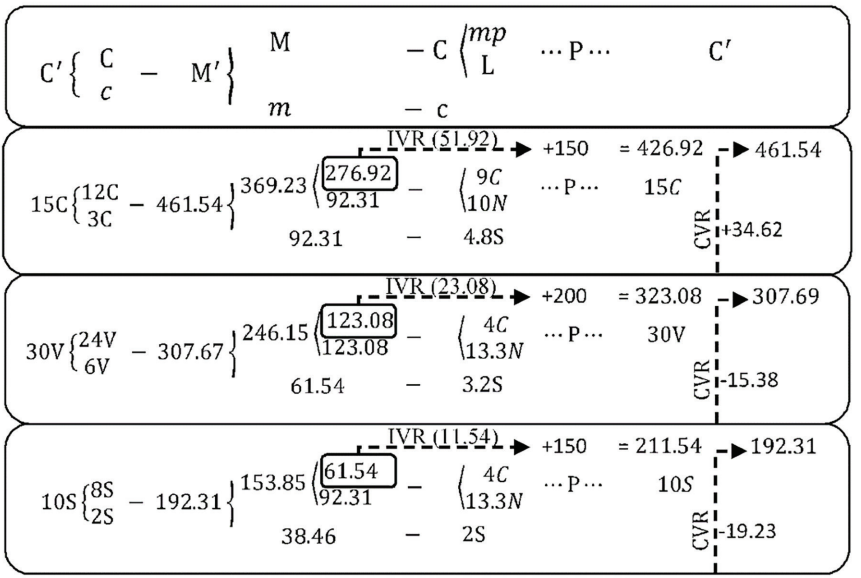

Figure 5. Circuit of CC' Based on Price of Production Relation (CVR and IVR)

However, the divergence between price and value impacts the movement of individual capital.

Again, expanding Von Bortkiewicz's example to an economy with multiple sectors does not alter the previous propositions. In a multi-fold economy, operating within the framework of the simple reproduction assumption, the following equation is employed to calculate the price of production after the modification of the cost price:

$$\mathbf{P}\cdot\mathbf{X}=\left(\mathbf{P}\cdot\mathbf{A}+\mathbf{P}\cdot\mathbf{W}\mathbf{r}^{\mathrm{T}}\cdot\mathbf{N}\right)+\frac{\left(\mathbf{P}\cdot\mathbf{A}+\mathbf{P}\cdot\mathbf{W}\mathbf{r}^{\mathrm{T}}\cdot\mathbf{N}\right)}{\left(\mathbf{P}\cdot\mathbf{A}+\mathbf{P}\cdot\mathbf{W}\mathbf{r}^{\mathrm{T}}\cdot\mathbf{N}\right)\cdot\mathbf{I}}*\left(\left(\mathbf{N}\cdot\mathrm{h}-\mathbf{P}\cdot\mathbf{W}\mathbf{r}^{\mathrm{T}}\cdot\mathbf{N}\right)*\mathbf{I}\right) \quad \text{(VI)}$$

Furthermore, IVR and CVR in individual branches are determined as follows: IVR equals $\mathbf{P}\cdot\mathbf{A}-\boldsymbol{\lambda}\cdot\mathbf{A}$, and CVR equals $\mathbf{P}\cdot\mathbf{X}-(\mathbf{P}\cdot\mathbf{A}+\mathbf{N}\cdot\mathrm{h})$. Under the condition of simple reproduction, the aggregate IVR equates to the total value-relocating of means of production. The aggregate CVR is also plainly always zero.

5. Concluding Remarks

In this study, we delved into the intricacies of value determination, emphasizing the significance of considering value transfer and distinguishing between the individual and aggregate levels, as presented in Section 2. Our primary goal was to illustrate the non-linear concept of temporality in value determination. By utilizing simultaneous equations, we have established a relationship between created and transferred values that aligns with this non-linear conception.

In our opinion, those interpretations of transformation that take input as given in the determination of output and reject the application of simultaneous equations for value determination (e.g., Temporal Single-System, and Macro-Monetary interpretation) put aside the consistent conception with value-transferring in favor of a linear conception of temporality. Consequently, they move value from the past to the present, not as a semi-material or a social relation but as a changeless natural character during the time.

Additionally, interpretations that acknowledge the application of simultaneous equations in value determination (e.g., the Iterative and Organic Composition of Capital Interpretations) and establish the relationship between created and transferred value, as we have discussed, must also consider a corresponding relationship between CVR and IVR when determining the price of production. Failing to do so would hinder their ability to grasp a concept of relocated value that remains consistent with the principles of value determination. Achieving this consistency requires a thorough consideration of the stratification of value and price. From this point of view, the current presentation can be considered a consistent exposition of the transformation of value into price.

In Section 3, we depicted a stratification of value and price based on ascending from commodity production to capitalist commodity production and from the capital in general to many capitals, i.e., in different abstraction levels. This hierarchical framework sheds light on the intricate relationship between different categories in the layers of value and price.

Upon this insight, those interpretations that make the transformation of value into price contingent upon choosing an invariance condition of two systems distort or overlook the relationship between the layers of value and price. More precisely, by ignoring the second layer, they transubstantiate the relation between the first and third layers into a relation between two separate systems that are related to each other through an arbitrary or axiomatic choice (e.g., Iterative and standard interpretations). As elucidated in this article, we contend that we are not dealing with two separate systems in need of an invariance condition to establish a connection. Instead, we have the unity of different layers as a rich totality.

In Section 4, we argue that a comprehensive examination of both temporality and stratification reveals the necessity of categorizing relocated values into two distinct types: current relocated value, tied to created value, and integrated relocated value, linked to transferred value. The relationship between these two types, CVR and IVR, mirrors the relation between created and transferred value, with the former positing the latter. In addition, both relationships reflect the integrated nature of the transferred value and IVR.

Thus, in our opinion, the standard interpretations distort the distance between value and price by selecting a normalization condition (the sum of value equal to the sum of price), turning the redistribution of surplus value into repricing within a new system. Therefore, it cannot distinguish two types of value-relocating from each other. The so-called Single-System interpretations (e.g., Rethinking Marxism, Temporal Single-System, and Macro-Monetary interpretations) endeavor, in this or that way, to eliminate the IVR and eventually erase the part of the distance between value and price rather than explain it.

However, it is evident that our approach, which considers both temporality and stratification, results in a transformation of value into price that is *merely quantitatively*[7] equivalent to the "new solution with a given wage bundle." However, our approach not only acknowledges the existence of IVR but also, distinct from NI, elucidates its relationship with CVR. The absence of this consideration in NI led to the proposition that the explanation for IVR should be sought on the path of iterative solution (Glick and Ehrbar 1987, 313). In contrast, our approach allows for the explanation of IVR through its connection with CVR and the relation of the branch producing means of production with other sectors of the economy.

This framework provides a starting point for further discussions and research in TP by illuminating the point that Marx's mathematical method of (but not logic) transformation is limited to CVR.

Notes

1. The interpretations are labeled in accordance with Moseley (2016).
2. As Marx aptly noted, "The former stands, as it were, in the pluperfect, the latter in the perfect tense, but this does not matter" (Marx 1990, 294).
3. Value price (pv) represents the ratio of value (λ) in terms of labor time to the value of a unit of the money-commodity (λg). The price of production (pp) is defined as the ratio of $\lambda + \Delta\lambda$ to λg. Given $\lambda g = 1$, we can substitute λ for pv and p for pp. Thus, all the numerical values provided for value price and price of production are given in terms of the unit of money. Indices C, V, S, and L respectively refer to the commodities of the first, second, and third branches and labor-power.
4. In this article, $\boldsymbol{\lambda}$, $\mathbf{N}$, $\mathbf{A}$, and $\mathbf{X}$ denote the horizontal vector of value prices, the horizontal vector of the number of workers, the input matrix, and the output diagonal matrix, respectively. The indices mp and ac denote the branches that produce means of production and articles of consumption, respectively.

5. This concept of temporality is influenced by Lukacs's exploration of causality and teleology in human practice (Lukacs 1980).
6. **Wr** represents the horizontal vector of real wages.
7. It's important to note that this interpretation has no relevance to the NI, as the new interpreters rejected that NI is compatible with calculations based on a given wage bundle (Fine, Lapavitsas, and Saad-Filho 2004, 6).

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References

Duménil, G. 1983. "Beyond the Transformation Riddle: A Labor Theory of Value." *Science & Society* 47 (4): 427–450.

Fine, B., C. Lapavitsas, and A. Saad-Filho. 2004. "Transforming the Transformation Problem: Why the 'New Interpretation' Is a Wrong Turning." *Review of Radical Political Economics* 36 (1): 3–19.

Foley, D. K. 1982. "The Value of Money the Value of Labor Power and the Marxian Transformation Problem." *Review of Radical Political Economics* 14 (2): 37–49.

Glick, M., and H. G. Ehrbar. 1987. "The Transformation Problem: An Obituary." *Australian Economic Papers* 26: 294–317.

Kliman, A., and T. McGlone. 1988. "The Transformation Non-problem and the Non-transformation Problem." *Capital and Class* 12 (2): 56–84.

Kosik, K. 1976. *Dialectics of the Concrete: A Study on Problems of Man and World*. Translated by K. Kovanda and J. Schmidt. Dordrecht: D. Reidel Publishing Company.

Lipietz, A. 1982. "The So-Called 'Transformation Problem' Revisited." *Journal of Economic Theory* 26: 59–88.

Lukacs, G. 1980. *The Ontology of Social Being 3. Labour*. Translated by D. Fernbach. London: Merlin Press.

Marx, K. 1969. *le capital*. Translated by R. Joseph. Paris: Editions sociales.

Marx, K. 1990. *Capital: A Critique of Political Economy*, vol. 1. Translated by B. Fowkes. London: Penguin Classics.

Marx, K. 2010a. *Capital*, vol. 1. Vol. 35 of *Marx & Engels Collected Works*. Digital edition. London: Lawrence & Wishart.

Marx, K. 2010b. *Capital*, vol. 2. Vol. 36 of *Marx & Engels Collected Works*. Digital edition. London: Lawrence & Wishart.

Marx, K. 2010c. *Capital*, vol. 3. Vol. 37 of *Marx & Engels Collected Works*. Digital edition. London: Lawrence & Wishart.

Marx, K. 2010d. "Economic Manuscripts of 1857–58." In *Marx & Engels Collected Works*, vol. 28, 5–48. Digital edition. London: Lawrence & Wishart.

May, K. 1948. "Value and Price of Production: A Note on Winternitz' Solution." *The Economic Journal* 58 (232): 596–599.

May, K. 1949. "The Structure of Classical Value Theories." *The Review of Economic Studies* 17 (1): 60–69.

McGlone, T., and A. Kliman. 1996. "One System or Two? The Transformation of Values into Prices of Production versus the Transformation Problem." In *Marx and Non-equilibrium Economics*, edited by A. Freeman and G. Carchedi, 29–48. Cheltenham: Edward Elgar Publishers.

Meek, R. 1956. "Some Notes on the 'Transformation Problem.'" *The Economic Journal* 66 (261): 94–107.

Moseley, F. 2016. *Money and Totality: A Macro-Monetary Interpretation of Marx's Logic in* Capital *and the End of the "Transformation Problem."* Boston: Brill.

Rosdolsky, R., D. Bathrick, and A. Rabinbach. 1974. "Comments on the Method of Marx's *Capital* and Its Importance for Contemporary Marxist Scholarship." *New German Critique* 3 (Autumn): 62–72.

Samuelson, P. A. 1971. "Understanding the Marxian Notion of Exploitation: A Summary of the So-Called Transformation Problem between Marxian Values and Competitive Prices." *Journal of Economic Literature* 9 (2): 399–343.

Seton, F. 1957. "The 'Transformation Problem.'" *The Review of Economic Studies* 24 (3): 149–160.

Shaikh, A. 1977. "Marx's Theory of Value and the 'Transformation Problem.'" In *The Subtle Anatomy of Capitalism*, edited by J. Schwartz, 106–139. Santa Monica, CA: Goodyear Publishing.

Shaikh, A. 1981. "The Poverty of Algebra." In *The Value Controversy*, edited by I. Steedman and P. Sweezy, 211–301. London: New Left Books.

Shaikh, A. 1982. "Neo-Ricardian Economics: A Wealth of Algebra, a Poverty of Theory." *Review of Radical Political Economics* 14 (2): 67–83.

Shaikh, A. 1984. "The Transformation from Marx to Sraffa." In *Ricardo, Marx, and Sraffa*, edited by E. Mandel and A. Freeman, 43–84. London: Verso.

Shaikh, A. 2016. *Capitalism: Competition, Conflict, Crises*. New York: Oxford University Press.

Sraffa, P. 1960. *Production of Commodities by Means of Commodities: Prelude to a Critique of Economic Theory*. Cambridge: Cambridge University Press.

Steedman, I. 1977. *Marx after Sraffa*. London: New Left Books.

Von Bortkiewicz, L. 1975. "On the Correction of Marx's Fundamental Theoretical Construction in the Third Volume of *Capital*." In *Karl Marx and the Close of His System*, edited by P. Sweezy, 199–221. London: Merlin Press.

Winternitz, J. 1948. "Values and Prices: A Solution of the So-Called Transformation Problem." *The Economic Journal* 58 (230): 276–280.

Wolff, R. D., B. Roberts, and A. Callari. 1982. "Marx's (not Ricardo's) 'Transformation Problem': A Radical Reconceptualization." *History of Political Economy* 14 (4): 564–582.