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# A model of values and prices based on a solution to the transformation problem and the redefinition of key categories of the Marxian labor theory of value

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**Abstract.** This article presents a comprehensive values and prices formation model based on Marx's (1992, 1993) labor theory of value within a Temporal Single-System Interpretation (TSSI) framework. This model bases on a new interpretation of the Marxian Fundamental Theorem (FMT) and the Monetary Expression of Labor Time (MELT). If the modification in the dialectical sequence of the formation of the categories and the introduction of the dual determination of socially necessary labor time are accepted, the transformation problem encounters solution in the interpretation of Carchedi and de Haan (1996). Likewise, contemporary approaches reveal the need for a redefinition of key categories of the Marxist labor theory of value to develop a logically coherent model. Thus, the proposed model includes the dimension of the realization problem that commodities face in the market and introduce analytical categories for both production and realization periods. Finally, value category is redefined.
**Keywords:** Karl Marx; labor theory of value; transformation problem of values into prices; realization problem; category; exploitation.

**JEL classification:** B14, B24, B51

## [es] Un modelo de valores y precios basado en una solución al problema de la transformación y la redefinición de categorías clave de la teoría del valor trabajo marxista

**Resumen.** Este artículo presenta un modelo integral de formación de valores y precios basado en la teoría del valor trabajo de Marx (1992, 1993) dentro de un marco de la Interpretación Temporal de Sistema Único (TSSI). Este modelo se basa en una nueva interpretación del Teorema Fundamental Marxiano (TFM) y de la Expresión Monetaria del Tiempo de Trabajo (MELT). El problema de la transformación encuentra una solución en la interpretación de Carchedi y de Haan (1996) al aceptarse una modificación en la secuencia dialéctica de la formación de las categorías e introducirse la determinación dual del tiempo de trabajo socialmente necesario. Del mismo modo, enfoques contemporáneos revelan la necesidad de una redefinición de categorías clave de la teoría del valor trabajo marxista para desarrollar un modelo lógicamente coherente. Así, el modelo propuesto incluye la dimensión del problema de realización que enfrentan las mercancías en el mercado e introduce categorías analíticas para los períodos de producción y realización. Finalmente, se redefine la categoría valor.
**Términos clave:** Carlos Marx; teoría del valor trabajo; problema de la transformación de valores a precios; problema de la realización; categoría; explotación.

## [pt] Um modelo de valores e preços baseado na solução do problema da transformação e na redefinição de categorias-chave da teoria marxista do valor-trabalho

**Resumo.** Este artigo apresenta um modelo abrangente de valor e formação de preços baseado na teoria do valor-trabalho de Marx (1992, 1993) dentro de uma estrutura da Interpretação de Sistema Único Temporal (TSSI). Este modelo é baseado em uma nova interpretação do Teorema Fundamental Marxiano (TFM) e da Expressão Monetária do Tempo de Trabalho (MELT). O problema da transformação encontra solução na interpretação de Carchedi e de Haan (1996) ao aceitar uma modificação na sequência dialética da formação das categorias e introduzir a dupla determinação do tempo de trabalho socialmente necessário. Da mesma forma, as abordagens contemporâneas revelam a necessidade de uma redefinição das categorias-chave da teoria marxista do valor-trabalho, a fim de desenvolver um modelo logicamente coerente. Assim, o modelo proposto contempla a dimensão do problema de realização enfrentado pela mercadoria no mercado e introduz categorias analíticas para os períodos de produção e realização. Finalmente, a categoria de valor é redefinida.
**Palavras-chave:** Carlos Marx; teoria do valor trabalho; problema da transformação de valores em preços; problema de realização; categoria; exploração.

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> It would be a mistake to base the whole analysis on textual evidence only, if one cannot provide some independent justification, either theoretical or empirical (Basu, 2021, p. 337)

## 1. Theoretical framework

In the disciplinary field of economic science, the labor theory of value is the only objective theory providing a conceptual framework that overcomes the problem of circularity (Astarita, 2004). However, within studies of the history of economic thought, the labor theory of value continues to be subject of controversy given Marx's unfinished work, *Das Kapital*, and especially due to the inner complexity of exchange relations, it aims to explain. Over time, several volumes have been written about what Marx "really meant", being Moseley's (2016) compendium the most recent example of exegesis. Instead of presenting an exegetical study, this article seeks to integrate heterogeneous contributions[2]. Hence, citations of Marx's work have been reduced to a minimum. Furthermore, one of the most controversial issues in the history of economic thought is the so-called transformation of values into prices of production. Its origins go back to the writings of Ricardo (2004) who tried to explain the long-run relationships between labor values, natural prices and average profits. To do this, Ricardo tried to reconcile the law of value with the law of equalization of profits, the so-called *transformation problem*. Ricardo (2004) argued that, in general, the prices of production deviate from the labor values, but still values can approximate the behavior of the prices of production. However, Ricardo could not explain certain issues regarding categories definitions (Marx, 1992). Ricardo even doubted about the one and only value-creating substance (Shaikh, 2007). Under this context, Marx inherited the transformation problem. Nonetheless, before Marx (1992, 1993) writings the problem was not clearly defined. Then, applying a rigorous method, Marx managed to expose it clearly and give it intensive treatment. However, Marx did not present a definitive solution but only a partial one. Furthermore, the way the solution was presented, and the unfinished nature of Marx's work allowed for the most diverse interpretations. Let us now examine the most relevant interpretations. Based on Verbeke (2019), it has been grouped the inquiries that deal with the transformation problem[3] in two great interpretative currents. On the one hand, *traditional interpretations* hold that in three volumes of *Das Kapital*, the dialectical process followed by elementary categories is not enough to explain market prices formation. However, as concrete phenomenal determination, market prices would be explained indirectly through prices of production, reminding the latter are governed by values (Bortkiewicz, 1907; Moszkowska, 1929; Sweezy, 1942; Winternitz, 1948; Meek, 1956, 1975; Okishio; 1963; Rubin, 1973; Desai, 1974). On the other hand, *non-traditional interpretations* affirm Marx's work shows enough indications for developing the theory of prices which is necessary to explain the most concrete determinations, and so, market prices. Within this heterogeneous group there are diverse proposals, premises and conclusions (May, 1948; Morishima, 1973; Shaikh, 1977; Foley, 1982, 1986; Freeman, 1991, 1996; Carchedi, 1991, 1996; Moseley, 1993, 2016; Carchedi and de Haan, 1996; McGlone and Kliman, 1996, 2007; Kliman and McGlone, 1999). This group of authors share the necessity for a *reinterpretation* of some key categories originally outlined by Marx. Parallel advances made by Morishima (1973) and Shaikh (1977) established precedent for linking values and prices in temporal frameworks. Additionally, Shaikh's (1977) treatment on the conversion measure between labor time units and monetary units led to what Foley (1982, 1986), Lipietz (1982) and Duménil (1984) developed and named as *Monetary Expression of Labor Time* (MELT)[4]. The founders of the New Interpretation (Foley, 1982; Lipietz, 1982; Duménil, 1984) and its contemporary exponents (Mohun and Veneziani, 2017; Yoshihara, 2017; Basu, 2021) point out that NI has three differences from previous solutions to the transformation problem. First, the solution is based on the net product and not the gross

[2] The author is aware of contemporary debates concerning Marxist labor theory of value (including among others: Potts and Kliman (2015) simultaneist-temporalist debate compendium, Mohun and Veneziani (2017) axiomatic review and Kliman and Moseley several comments entries (between 2016-2019) available on http://www.marxisthumanistinitiative.org/ [accessed: 19 August 2022]). In regard, debates are fruitful if they push arguments to demonstrate inner coherence. Nonetheless, instead of clarification some debates may seed confusion and misunderstanding. Precisely, when argumentation becomes a "science-disguised-weapon" to attack other contributors, nothing good can come out of it. Sadly, contemporary Marxism is plagued of such "argumentation method". This bias led to call into question the assumption of positive prices in a capitalist economy (for Mohun and Veneziani's absurd criticisms and Freeman and Kliman's reply see Potts and Kliman (2015: chapters VII and VIII). Instead of looking for agreement points, prevails (unfounded) disagreement, which leads to "branch" Marxism and generate tons of approaches. While it is not a novelty, it does not mean it would not need to change. This article comprises a humble attempt towards *integration*.

[3] Exclusively those inquiries from the Marxist labor theory of value.

[4] In Foley's (1986) work, the MELT is called the Monetary Expression of Value (MEV).

product. Second, there is a peculiar conception of the value of money (and the MELT) based on the net product. Third, there is a new definition of the value of labor power. Beyond agreeing or not with the NI, it must be recognized these conceptual advances encouraged new contributions in several unexplored topics within Marxism (Basu, 2021). On the other hand, a contemporary "outlier" work deserves special attention: the non-deterministic approach of Farjoun and Machover (1983). Chaos theory is in the antipodes of determinism, where the transformation debate sustains. Nevertheless, this approach aims to reveal background dynamics. These authors emphasize the degree of complexity of value-price formation system in a capitalist economy and criticizes the *uniform* rate of profit and thus the formation of the prices of production. Farjoun and Machover's approach serves to remember market's changing and *anarchic* nature, and to note the difficulty of reducing systemic inherent complexities (Verbeke, 2019). In regard, the prevailing context establishes the conditions for commodities realization. To what extent this context is auspicious or inconvenient depends on market vicissitudes (Marx, 1993). Again, among deterministic approaches, Freeman (1991), Carchedi (1991), Freeman and Carchedi (1996), Kliman and McGlone (1999) and Kliman (2007) offer decisive contributions for arising the *Temporal Single-System Interpretation* (TSSI). This approach presents a common structure that establishes a *single system* for values and prices as well as a *temporal* or *sequential* order of presentation of Marxian categories. Furthermore, these authors say capital inputs, namely, the cost price components, *may differ* between the production and circulation processes. Another relevant contribution comes from the so-called Macro-Monetary approach developed by Moseley (1993, 2016). In regard, Moseley (2016) offers an alternative reading of Marx's writings given they have been commonly misinterpreted[5]. Thus, Moseley proposes to solve the transformation problem setting a value-price system based on the *circuit of money capital*. The Macro-Monetary approach argues that the capitalist system operates on money, that is, Marxian categories should focus on money relations. Finally, among non-traditional interpretation proposals, Carchedi and de Haan (1996) stands out for its original approach to the transformation problem focusing on the process of market prices formation[6]. Within a TSSI framework, Carchedi and de Haan's (1996) proposal contains two implicit premises that constitutes fundamental pillars in their model. The first one refers to the change of the *dialectical sequence* in the determination of Marxian categories. According to Marx, the dialectical process of elementary categories is as follows*: value, direct price, price of production* and *market price*. Meanwhile, for Carchedi and de Haan, these categories follow a different dialectical path: *value, direct price, market price* and *price of production.* According to Carchedi and de Haan (1996), the transformation process operates from direct prices to market prices, and once reached the market prices from these to production prices. Therefore, to know the market prices it is not necessary to establish the production prices first. The second premise lies on a *new interpretation* of Socially Necessary Labor Time (SNLT). Following Carchedi and de Haan, commodity comprises SNLT established in two periods. Both production and realization conditions set SNLT. Initially, for the individual producer, commodity acquires *potential value* in correspondence to individual expended labor time. However, there is no socially labor time involved. Then, SNLT find its first social determination and tentative approximation to *actual values* once modal production conditions set *market values*. Thus, Carchedi and de Haan implicitly assume individual producer is the modal producer so (individual) potential values are (social) market values. Hence, individual labor time is equal to labor time given by the modal production conditions. Finally, SNLT find its second social determination and definitive approximation to actual values once realization conditions set *realized values.* Once commodity sells, it acquires *realized value* given by validated labor time.

## 2. The model

The proposed system of equations is composed of variables belonging to the periods of production and realization[7]. The *potential, market* and *realized* features obey to the specific instance commodity goes through. Potential feature refers to an *individual category* while both market and realized features refer to *social categories*. By introducing the novelty of the new determination instance, the traditional system of equations has seen multiplied its number of variables. Additionally, new categories related to capital losses arise: *loss* and *loss rate*.

### 2.1. Socially necessary labor time

Dual interaction between production and circulation processes determines labor time. Firstly, the Abstract, Social and Expectedly Necessary Labor Time (ASENLT), dictated by modal production conditions configures the *first social determination* (Astarita, 2004) and *tentative approximation* to actual values. In other words, it constitutes the "supply side" labor time[8]. This first so-

[5] TSSI and Macro-Monetary approaches point out Marx did not make mistakes, but *Das Kapital* has been misinterpreted.

[6] Surprisingly, the TSSI approach of Carchedi and de Haan (1996) has been excluded from most recent reviews on the transformation problem like Moseley (2016), Mohun and Veneziani (2017) and Basu (2021).

[7] Before going any further, let us clear some notions. First, models are useful abstractions developed to explain a fraction of reality. Models base on coherent theoretical frameworks, general rules, and categorical relations. Hence, the proposed model is like any other. Second, those readers who connect the term *model* to complex mathematical relations and sophisticated equations will be disappointed. This article aims to define and redefine categories focusing on theoretical aspects rather than mathematical formalization. Accordingly, the importance of the model does not rely on numerical results but focus on establishing the relations within the categories of the labor theory of value to understand exchange relations under capitalism.

[8] Modal production conditions set abstract, social, and expectedly *necessary* labor time, where the unknown to elucidate under realization is its *necessary* feature, not its social or abstract feature.

cial determination of necessary labor time results from labor time expended by most diffused and/or influencer technology across the sector (i.e., modal producers' technology). Secondly, the Abstract, Social and Actually Necessary Labor Time (ASANLT), determined by realization conditions, constitutes the *second social determination* (Astarita, 2004) and *definitive approximation* to actual values. In other terms, it constitutes the "demand side" labor time. This second social determination of necessary labor time results from labor time set by commodity's realization[9]. The coefficient λ indicates the relationship between the ASANLT and the ASENLT, and it measures how much labor time of the modal production conditions validates under realization conditions (ASANLT/ASENLT). The labor time incorporated into the commodity during an individual production process measures as *individual value* $(w_i)$. In money terms, the form of expression of individual value is the *potential value* $(w_p)$. Following Shaikh's (1977) transformation procedure let us assume potential value manifests itself as direct price of the individual value, i.e., potential value expresses itself as price directly proportional to individual value. Then, at the end of every individual production process, commodity comprises *potential value*. Nonetheless, commodity still must face dialectical negations through both social determinations. Thus, modal production conditions arise *market value* $(w_m)$. Hence, to determine productivity levels, it seems necessary to verify the relation between (individual) potential value and (social) market value[10]. In other terms, it is relevant to identify how much of expended labor time is expected to realize under normal exchange conditions, as producers exactly satisfy social need (Rubin, 1973). Next step consists in the realization of the commodity in the market. Society determines the *realized value* $(w_r)$ . Thus, through the dual determination of labor time, realized values emerges and commodity gives its critical leap (Marx, 1992). Once commodity is produced its individual labor time is ready to go through *two instances of social confirmation* (Astarita, 2004). In *first instance*, the individual labor time faces the social labor time of the production conditions, that is, it faces the first determination of the SNLT (the ASENLT). Individual producers compare their own levels of productivity against the modal producers' respective levels of productivity. Because of this comparison, the *innovator*, *modal* or *backward* producer emerges. In *second instance*, individual labor time faces social labor time of the realization conditions, that is, it faces the second determination of the SNLT (the ASANLT). However, this comparison is not direct but through the social labor time of the production conditions. Producers compare (social) expected labor time with (social) realized labor time. Then, through the sale of the commodity, necessary labor time establishes as realized value and realized surplus value arise. From such comparison arises one of the following realization scenarios: i) *superprofit*, ii) *expected*, or iii) *realization problem*. Allowing the subsistence of backward producers, those relatively unproductive producers who use backward technology (Marx, 1993, p. 279), favorable realization conditions may occur. On the contrary, preventing innovator producers from obtaining extraordinary profits, unfavorable realization conditions may occur. In fact, realization conditions can turn so adverse null profit would not allow distinguishing between the innovator, modal or backward producer. This possibility is absent in Marx' original scheme. In *Das Kapital*, Marx assumes supply conditions are correspond to demand conditions (Rubin, 1973, p. 177). As a result, there is *absence* of the realization problem. Additionally, this assumption leads to accept the conditions of production *univocally* determine the necessary labor time. That is, Marx assumes necessary labor time equals the labor time of modal producers, the labor time of the "supply side". As mentioned, it constitutes the first step towards the configuration of necessary labor time. This is the labor time from realization conditions, the labor time of the "demand side". In this sense, Carchedi and de Haan's (1996) approach introduces demand conditions as variable factor, for which a new instance of social confirmation of labor time emerges. In regard, a higher degree of analytical complexity achieves. Then, dual determination of labor time establishes *sequential* or *temporal* categories according to the periods of production and circulation. Here, *potential value, market value* and *realized value* define. Individual producer's labor time sets *potential value*. Modal producers' labor time sets *market value.* Finally, through labor time validation, realization conditions establish *realized value*. Let us examine each of value components. Potential value composes of *potential constant capital* $(c_p)$, *potential variable capital* $(v_p)$, and *potential surplus value* $(s_p)$. Market value composes of *market constant capital* $(c_m)$, *market variable capital* $(v_m)$, and *market surplus value* $(s_m)$. Realized value composes of *realized constant capital* $(c_r)$, *realized variable capital* $(v_r)$, and *realized surplus value* $(s_r)$.

$$w_p = c_p + v_p + s_p \quad (1)$$

$$w_m = c_m + v_m + s_m \quad (2)$$

$$w_r = c_r + v_r + s_r \quad (3)$$

### 2.2. Transformation of values into prices

Let us examine the process of transformation of values into prices. The first conversion of values into direct prices operates through the MELT. The value of money and the MELT are the two sides of the same coin and express the relation between units of labor time and monetary units. Properly, Foley (1986, p. 15) defines the MELT as "how much value in monetary units an hour of labor time creates". This definition is appropriate and fits into the proposed model. The MELT Foley (1986) defines is the one market establishes once price arises, i.e., once demand validates certain amount of labor time as necessary. This MELT links individual value and

[9] Dussel (1985, p. 191) affirms realization is the act by which something reaches its fulfillment.

[10] In order to develop social categories individual categories are *strictly necessaries* (Umpiérrez, 2020).

realized value. Hence, if it refers to the same concept it could be called "actual MELT" or just MELT. This MELT is unique and bases upon the ASANLT. In other words, the "actual MELT" is the one *finally counts* because it results from realization conditions. Nonetheless, before the commodity arrives to the market every producer defines for the latter a tentative price. In fact, every commodity needs to carry a (tentative) price on all over the road until realization. Moreover, the producer pursuits the validation of labor time expended in the individual production process. Consequently, every individual production process comprises a conversion of (potentially necessary) labor time into (potential) monetary units. There must exist some monetary expression for individual value *before* commodity faces realization conditions (Dussel, 1985, p.204). Through the conversion of value into (potential) monetary units, individual value links potential value. The conversion factor may be called as "tentative MELT" or other way, as long its concept refers to tentative (potential), not definitive (realized), units. The "tentative MELT" bases upon potentially necessary labor time. The "tentative MELT" is merely an individual approximation to the "actual MELT", and it may not coincide at all. Divergence grows as (individual) potential value withdraws from (social) realized value. In the end, convergence between both MELTs depends upon individual production conditions are correspond to social production conditions and social need[11]. The "tentative MELT" is useful for explaining tentative prices that arises between periods of production and realization[12]. Paradoxically, once realization occurs tentative MELT becomes *anecdotic,* but it is important given it comprises the first conversion from values into direct prices. As Shaikh (1977) holds, the transformation of values into direct prices[13] involves the first step in the process of transformation of values into prices of production. Through the tentative MELT, *individual values* convert into *potential values* and manifest as direct prices. This process transforms labor time units into (potential) monetary units. Subsequent categories express on money. Individual value corresponds to the category developed by Marx (1992, pp. 434-436; 1993, pp. 279-285) and its magnitude is measured by the labor time expended during the individual production process. Here, seems appropriate to clarify methodological issues regarding the transformation process. Firstly, it is clear that value cannot be an asocial category (Rubin, 1973). Value definition relies on the interaction between producers and buyers. Both categories individual value and potential value acquire sense only when they compare to *social categories*, that is, when they compare against the market value or realized value. Once again, dialectics involves the interaction. If individual value and *private labor* separate from market validation, they become meaningless categories. Social value and *social labor* must arise as their respective and necessaries negations. In other words, individual production finds two instances of negation in the (modal) production conditions and in the realization conditions (Astarita, 2004). Consequently, if individual value is far from realization and until it does not pass-through social determinations *not a single shadow* of value creates. Individual labor time must face both instances of social confirmation. Secondly, according to Cámara Izquierdo (2003), value has three core characteristics: *substance*, *magnitude* and *form*. The latter establishes the form of appearance of value is price. Therefore, the *form of manifestation* of value as monetary price *necessarily occurs* in the market (Shaikh, 2007). It explains why prices cannot appear out of nowhere, but they are constituted by values. As Shaikh (1977) clarifies, the transformation process does not start from values but actually goes from some prices to other prices. Consequently, it should not be correct to frame the matter as the "transformation of values into prices of production", because values *always* appear in the form of prices. On the contrary, the necessary form of manifestation could be confused with some particular conversion of prices into prices (Moseley, 2016). Following Carchedi and de Haan (1996), the second step in the process of transformation of values into prices of production is the transformation of direct prices into market prices. Conversion operates through the realization of commodities. Thus, demand conditions establish the ASANLT and market prices arise, as commodities sell. The third and last step in the process of transformation of values into prices of production is the transformation of market prices into prices of production. Thus, once market prices define, the prices of production can calculate. Prices of production establish as tendential prices (Carchedi, 1996; Carchedi and de Haan, 1996). This manner concludes the process of transforming values into prices of production through the stages of formation, conversion, and validation of potential values into realized values to, finally, estimate prices of production from market prices. Clearly, under this conceptual framework, market prices are under the spotlight. When the first metamorphosis of the commodity is introduced, Marx says commodity $(C)$ separates from money $(M)$ by the special leap called the "commodity's *salto mortale*" (Marx, 1992, p.200). However, even though Marxist theory of labor value emphasizes the unpredictability feature of market realization and explains the roots of crisis under capitalism, there is a void in model formulation and in the explanation of market prices formation (Freeman and Carchedi, 1996).

### 2.3. Social confirmation and the realization problem

As seen above, both instances of social confirmation interact so market prices appear. The *first instance of social confirmation* occurs as commodity faces modal production conditions. Let us assume there are three producers each of them with different levels of productivity, namely, the innovator, the modal, and the backward pro-

[11] Let us take the case of the modal producer. If realization conditions are equal to modal production conditions, then tentative and actual MELTs are equal.

[12] Contemporary approaches skip the "between periods" time-lapse. This is the sub-period when the produced commodity is awaiting for realization (Dussel, 1985, pp. 203-4), and where tentative MELT exists.

[13] It is worth noting Shaikh's values are individual values as well as direct prices are potential values here.

ducer. Thus, the innovator expends less labor time than the one given by market value $(w_p < w_m)$, the modal producer employs the exact labor time according to the market value $(w_p = w_m)$, and the backward producer takes more labor time than expected $(w_p > w_m)$. Under the assumption of competition, none of three individual producers can set price above market value. Still producers could reduce the price of their commodities[14]. In fact, despite productivity differences producers seek to realize their commodities at the market value (Rubin, 1973, pp. 188-9). In the case of the *innovator producer*, the labor time expended by innovator production process is below the ASENLT. Here, *potential cost price* $(k_p)$ is below *market cost price* $(k_m)$, so potential value is below market value. At respect, the innovator could set a lower price. However, if technology does not diffuse, there is no need to do it. Consequently, in the short term, if the innovator technology does not *generalize*, the innovator can appropriate an *extraordinary surplus value* or *superprofit*. The difference between market cost price and potential cost price emerges extraordinary surplus value. At this level of abstraction, there are neither changes in social need nor commodities production variations[15]. Accordingly, if innovator's cost price is below market cost price $(k_p < k_m)$, there is only one way to satisfy potential value equals market value $(w_p = w_m)$, that is, in presence of extraordinary surplus value $(s_p > s_m)$. In the case of *modal producer*, the labor time expended by the individual producer equals the ASENLT. Potential cost price is equal to market cost price $(k_p = k_m)$; potential surplus value equals market surplus value $(s_p = s_m)$, so that potential value and market value are identical $(w_p = w_m)$. In the case of the *backward producer*, the labor time expended by the individual producer is above the ASENLT. Potential cost price is above market cost price $(k_p > k_m)$ and potential value is above market value $(w_p > w_m)$. Nevertheless, no producer has enough power to increase price, which is why potential value can be lower but not higher than market value. In fact, here market value operates as *social limit* to validate individual potential value. Therefore, as same as the innovator, the backward producer takes market value as the top limit to set potential value. In relation to potential surplus value, the backward producer starts an individual production process where potential surplus value is equal to, higher or lower than market surplus value. The only condition to define the backward producer is that potential cost price is above market cost price. As mentioned for the innovator's case, the realization clarifies the scheme by establishing the quantitative relation. In summary, this is merely the first instance of social confirmation. Consequently, given the sale of the commodity is still pending, all conclusions must be considered as partials. The *second instance of social confirmation* presents once commodity realizes. Realization depends on the vicissitudes of the market. Commodity acquires *social confirmation* as society establishes its necessity as *use value* and *value* by validating certain quantity of abstract, social, and *necessary* labor time. According to Marx analysis, producers exactly satisfy social need. Given this assumption, average production conditions determine *univocally* the SNLT[16]. This assumption implies to consider only one possibility to obtain superprofit as well as only one possibility of potential value non-validation, that is, in the case of the backward producer. Under this point of view, variations on production conditions focus exclusively on costs structures. Accordingly, once modal conditions set price, the capitalist appropriates equal to, more or less than expected profit. However, as production conditions *change costs*, market vicissitudes lead to *change prices*. At respect, despite absence of deep inquiry, in chapter X of volume III of *Das Kapital*, Marx (1993) analyze realization conditions and particularly explains the realization problem. Precisely, Marx (1993, p. 297, emphasis added) affirms "the *problem* therefore *is to sell commodities*, and this is a minimum requirement, at prices which deliver the average profit". Nonetheless, even accepting Marx did study realization conditions, as shows Rosdolski (1977), there is a void in explanation of realization conditions under the labor theory of value. This bias obeys to different reasons. Roll (1973) affirms the formation of ideas and economic concepts directly correlates to the degree of complexity of societies. Accordingly, society's advances should encourage new theoretical advances to explain inner complexities. In sum, economic categories need to find their own place within some coherent framework. Hence, as labor theory of value is the only objective theory who skips the problem of circularity it offers a suitable framework for new theoretical advances. Then, let us now mention some studies on realization. On the one side, Rosdolski (1977) studies the realization problem from Marx's reproduction schemes and emphasizes the elements of capital production that condition and limit valorization. Thus, the purchasing power and the type of commodities consumed by capitalist and workers is the fundamental piece to sustain the "valorization equilibrium". Likewise, the contradictions that lead to the breakdown of equilibrium are found in the capital-labor relationship itself. On the other side, Dussel (1985) focus on *devaluation process* as the valorization process opposite. Capital is condemn to a "death principle" of continuous metamorphosis in order to increase itself (Dussel, 1985, p. 192). In doing so, disequilibrium and crisis appear as natural movements. Now, both contributions are compatible with the proposed model. To prove it, let us introduce changes in some Marxian *categories*, by accepting changes in SNLT. Properly, in the situation of "shortage" when the mass of products is not enough to satisfy social need, the market validates an ASANLT

[14] Here seems more appropriate using *product* instead of *commodity* category because the latter implies a specific type of social context, and as long as the market validation is still pending, the individual producer would not have produced a commodity yet (Marx, 1992). Nonetheless, adding that distinction along the text could generate confusion.

[15] Supply and demand are customary (Marx, 1993, p. 286).

[16] Marx (1993, p. 283) explains in which specific case is correct assuming the average is the best approximation to socially necessary labor time. Instead of the average, for the proposed model modal conditions are chosen following Carchedi (1991) and Astarita (2015).

above the ASENLT. Commodities sell above the market value and social need absorbs smaller than expected quantities (Rubin, 1973; Shaikh, 2007). On the contrary, in the situation of "abundance" when the mass of products exceeds the social need, the market validates an ASANLT below the ASENLT. Commodities sell below the market value and society absorbs larger than expected quantities (Rubin, 1973; Shaikh, 2007). Additionally, in the latter situation if total realization problem arises, there would be no realization, as the ASANLT would take null expression. Consequently, since realization conditions are *unknown*, there are three alternatives realization scenarios. First, under the *superprofit realization scenario*, the ASANLT is above the ASENLT, realized value is above market value $(w_r > w_m)$, and realized surplus value is above market surplus value $(s_r > s_m)$. Second, under the *expected realization scenario*, the labor time of modal producers, the ASENLT, and the labor time of realization conditions, the ASANLT, are identical. realized value is equal to market value $(w_r = w_m)$, and realized surplus value equals market surplus value $(s_r = s_m)$. Third, under the *realization problem scenario*, the ASANLT is below the ASENLT, realized value is below market value $(w_r < w_m)$, and realized surplus value is below market surplus value $(s_r < s_m)$. Although the superprofit realization scenario in terms of extraction of extraordinary surplus value has been extensively studied (Sweezy, 1942; Gill, 2002; Shaikh, 2007), still the introduction of new categories leads to examine new questions. One situation that requires special analysis is the case of the *realization problem*. This situation occurs when the commodity realizes at a lower level than expected value. There arise two alternatives: the *realization problem* can be *partial* or *total*. The *partial realization problem* arises when the commodity realizes below its market value, so it may cover expected production costs completely or partially. In this case, realized surplus value is below market surplus value and, even, it might be null. Anyhow, under this circumstance, commodity *sells*. Instead, the *total realization problem* occurs when commodity does not realize at all, so that expected production costs are not even partially covered. In this case, realized value and realized surplus value are both null. In regard, under the circumstance where potential value cannot change its *potential feature*, seems interesting to wonder about what defines the *category of value*. If value cannot materialize at any price, is it there value? Otherwise, given its natural feature, is potential value a value incomplete category and merely configures one precondition for realization? In other sense, does the absence of realization destroy value? Eventually, does value wrongly identify with another yet *undefined category*? Indeed, last question summarizes the previous ones. If the answer is positive, it should be necessary to redefine the category of value as well as identifying the undefined category. For *now*, potential value occupies the undefined category's place. Regardless of proper conceptualization, the realization problem surges as real possibility in the process of capital circulation and specifically as a *threat* for surplus value realization. In fact, surplus value realization is decisive for the accumulation process as capitalists seek to realize the highest rate of surplus value (Shaikh, 2007). Accordingly, the rate of surplus value follows three determination states. The individual production process arises *potential rate of surplus value* $(\mu_p)$. However, they must face modal production conditions, which arises *market rate of surplus value* $(\mu_m)$. Finally, the *realized rate of surplus value* $(\mu_r)$ shows the proportion of surplus value that capitalists validate.

$$\mu_p = \frac{s_p}{v_p} \tag{4}$$

$$\mu_m = \frac{s_m}{v_m} \tag{5}$$

$$\mu_r = \frac{s_r}{v_r} \tag{6}$$

### 2.4. Exploitation, surplus value and profit

Commonly, in Marxian analysis both categories *exploitation* and *surplus value* so linked as if they were synonyms. Particularly, the rate of exploitation and the rate of surplus value are often referred to the same concept by most scholars (Sweezy, 1942; Desai, 1974; Gill, 2002; Astarita, 2004; Shaikh, 2007; Basu, 2021). Nevertheless, under the proposed model both categories comprise different definitions. Those differences rely on the concept of *surplus labor* and, consequently, they are not merely semantics. Let us examine the interaction between potential rate of surplus value and realized rate of surplus value, which may shed light on *exploitation* and *surplus value* direct and indirect links. To doing so it is necessary to analyze the scenarios where: i) realized rate of surplus value is positive and it is below potential rate of surplus value and, ii) realized rate of surplus value equals zero. These scenarios arise some trigger questions. If realized rate of surplus value is below potential rate of surplus value, was exploitation as *intense* as expected? In that case, should it be correct to talk about "underexploitation*"*? Moreover, if realized rate of surplus value equals zero, should still be correct to speak of exploitation? Understanding the concept of exploitation *transcends* its traditionally-assigned-quantitative-character is the first step to answer these questions. Respectively, it becomes fundamental to distinguish between concepts of *exploitation* and *surplus value*. The concept of exploitation exceeds the level of superficial relations of exchange. As Desai (1974) affirms, exchange obscures its underlying relations. Hence, the *presence* and *degree of intensity* of exploitation should not depend on the magnitude of realized rate of surplus value, which is unknown until realization happens. Conversely, exploitation must be defined for the specific period where it takes place, that is, during the individual production process. Once exploitation *consummates*, the commodity is ready for sale[17]. In this case, the capitalist

[17] Under capitalism, exploitation represents *sine qua non* condition for the existence of the commodity.

obtains equal to, greater than, or less than expected profit, or even *null profit*, depending on realization conditions. Thus, realization shows to what extent exploitation *provides* profit to the capitalist. For this reason, potential rate of surplus value, corresponding to individual production process, expresses the *magnitude* and *intensity* of exploitation. Otherwise, it could be wrongly concluded that the capitalist has not exploited the worker, or not as much as expected, because exploitation would not provide expected profit. In this line, if the capitalist does not obtain any surplus value, some could rise the argument of "inverse exploitation", that is, exploitation from the worker towards the capitalist. Under this situation, the worker obtains a monetary income in exchange for the use of labor power while the capitalist would either barely cover the production costs or, even, face capital losses. In any case, the capitalist would not obtain surplus value. However, adopting this type of reasoning would lead to a *flagrant* error. Conversely, elementary premises of the labor theory of value stands the production of commodities *for the purpose of profit* necessarily *implies exploitation* (Okishio, 1963; Morishima, 1973; Shaikh, 1977). To clarify these notions, it is sufficient using the concept of *surplus labor*. In every production process, the capitalist imposes on the worker a working day greater than necessary to recover the capital investment. The capitalist, even the most backward of all, seeks to validate surplus labor time. Precisely, here situates the *source* of exploitation. As other categories developed above, the surplus labor has different determination stages. It is either potential, expected, or realized. Under the capitalist mode of production, every individual production process must comprise (potential) surplus labor as *necessary condition* for the existence of (positive) surplus value. During the individual production process, the worker produces more than necessary (Marx, 1992). Hence, (potential) surplus labor time materialize into *potential surplus product*, which the capitalist seeks to validate at the *market surplus product* level (set by modal production conditions). Realization conditions determines to what extent (potential) surplus product validates. Thus, surplus product *indirectly reveals* exploitation[18]. Which leads to an important conclusion. Exclusively surplus labor *directly reveals* exploitation (Meek, 1956, p. 96, n. 4). In money terms, surplus labor time is unpaid labor the capitalist appropriate and will try to validate. The worker *is paid below money is expected* to be obtained by commodity's sale. Then, if the worker were paid the equivalent of the value of the commodity or, in a *hypothetical and unreal* case, above it, then, it would not be correct to speak of class exploitation, since there would be no surplus (labor, product and value) that the capitalist could (potentially) appropriate. Nevertheless, these alternatives are not reproducible *under capitalism*. In exchange for the use of labor power, the worker *normally* receives a fraction of the total amount that the capitalist expects to obtain. The capitalist has an incentive to invest only in productive processes of capital (Marx, 1992). Thus, the capitalist tries to appropriate the potential surplus labor in the form of potential surplus product to validate it as realized surplus value. This shows the concept of exploitation goes deeper than the realization of surplus value. For instance, exploitation exists from the moment the capitalist extracts potential *surplus labor.* This act is possible due to *alienation* of the *commodity* (Dussel, 1985, p. 204). Then, to "confirm" and "verify" the degree and intensity of exploitation it is not correct to *wait for* realization occurs[19]. In fact, exploitation confirms and verifies in the *production process*, that is, in the period that places the protagonists in their role, the worker as *exploited* and the capitalist as *exploiter* (Shaikh, 2007). Once settle the difference between exploitation and surplus value, it is easier to explain *superexploitation* (overexploitation) case. Marini (1973, pp. 38-42) affirms superexploitation bases on three mechanisms that combine themselves to capitalists obtain higher profits. These mechanisms are: i) intensification of labor (relative surplus value); ii) extension of the working day (absolute surplus value) and iii) expropriation of part of the labor necessary for the suitable reproduction of the worker. In sum, superexploitation corresponds to the situation where the labor power is paid below its value. Let us now fit superexploitation concept into the proposed model. When commodity validates a rate of surplus value above expected rate, an extraordinary rate of surplus value verifies. Nonetheless, the extraordinary rate of surplus value does not imply that the worker has been super-exploited (overexploited), since there is no way to apply a sort or exploitation *ex post*. Properly, exploitation *always and solely* occurs during the production process and ends with it once the capitalist already paid the worker for less than the equivalent of the value of product and has alienated the product of the worker's effort. In the same way, if superexploitation occurs it *solely* happens during the production process and ends with it[20]. In doing so, focus should be over the individual production processes because they establish to what extent workers are exploited by mentioned mechanisms. It must be clear that both categories exploitation and superexploitation *exclusively* correspond to the production period. Then, once set realization conditions it should be wrong make conclusions about them[21]. Realization conditions establish *to what extent* exploitation (and if so superexploitation) provides profit to the capitalist. Then, extraordinary surplus value refers to the simple fact that the capitalist has *underestimated* the potential surplus value and/or the expected surplus value. In other words, the commodity realizes more profit *than expected*. It should be clear that the act of obtaining profit from the commodity belongs *exclusively* to the capitalist. The worker does not participate on commodity's realization. Once the production process has ended, exploitation has been

[18] Surplus product scholars like Sraffians and neo-Ricardians do not focus on the difference between surplus product and surplus labor.

[19] Precedent explanation will result obvious if we simply understand potential surplus value comes from potential surplus product, which itself comes from potential surplus labor. If so, it is easy to find the inner connection between surplus value and exploitation.

[20] Superexploitation notes in the comparison between potential value composition and modal production conditions (i.e., modal producers establish average/modal exploitation conditions).

[21] In the proposed model, wages are paid at the beginning of the production period. Thus, superexploitation defines independently from realization conditions.

consummated. Consequently, exploitation as well as superexploitation can yield or not profit (given proposed model does not guarantee profit appropriation *ex ante*). Precisely, realization *cannot undo or change* what production already did to the worker[22]. Production already established exploitation (and if so superexploitation) conditions. That is, realized surplus value rate cannot determine the level of exploitation that the worker *already* suffered in a previous period. The worker is exploited (and if so superexploited), *regardless* the level of the rate of realized surplus value. The realization of the commodity establishes *to what extent* exploitation *transforms* into profit. To clarify, let us now analyze the forms of realization of profit through the rate of profit[23]. The *potential rate of profit* $(\pi_p)$ is the proportion of profit that emerges from the individual production process. The *market rate of profit*$(\pi_m)$ is the proportion of profit set by modal production conditions. The *realized rate of profit* $(\pi_r)$ is the proportion of profit validated.

$$\pi_p = \frac{s_p}{c_p + v_p} \tag{7}$$

$$\pi_m = \frac{s_m}{c_m + v_m} \tag{8}$$

$$\pi_r = \frac{s_r}{c_r + v_r} \tag{9}$$

The producer of commodities tries to obtain the potential rate of profit, which market rate of profit confronts and restricts. Likewise, realized rate of profit may differ from market rate of profit. Since realized surplus value depends on the conditions of realization, necessarily, a commodity will face one of the following *profit realization scenarios*.

*I.* *Extraordinary profit realization.* Realized surplus value is above market surplus value $(s_r > s_m)$, realized rate of profit is above market rate of profit $(\pi_r > \pi_m)$, and realized rate of surplus value is above market rate of surplus value $(\mu_r > \mu_m)$.

*II.* *Expected profit realization.* Realized surplus value equals market surplus value $(s_r = s_m)$, realized rate of profit equals market rate of profit $(\pi_r = \pi_m)$, and realized rate of surplus value equals market rate of surplus value $(\mu_r = \mu_m)$.

*III.* *Below expected profit realization.* Realized surplus value is positive and is below market surplus value $(s_r < s_m)$, realized rate of profit is below market rate of profit $(\pi_r < \pi_m)$, and realized rate of surplus value is below market rate of surplus value $(\mu_r < \mu_m)$. Here, *partial realization problem* arises.

*IV.* *Null profit realization.* Realized surplus value, realized rate of profit, and realized rate of surplus value are null $(s_r = 0; \pi_r = 0 ; \mu_r = 0)$. Here, either *partial* or *total realization problem* arises[24].

### 2.5. Fundamental Marxian Theorem

Along with exploitation definition, once set diverse realization profit scenarios; let us discuss the *Fundamental Marxian Theorem* (FMT). In short, the theorem states surplus value is *the only source* of profit (Okishio, 1963; Morishima, 1973). In other terms, all profit comes from surplus value, and surplus value *directly links* to labor power exploitation. In context, Okishio and Morishima belong to the current of thought known as Analytical Marxism which focuses on mathematical formulation and, particularly, seeks to achieve a synthesis between the labor theory of value and orthodox general equilibrium economic theories such as Leontief or Von Neumann models (Zhang, 2019). For this reason, the FMT has been formulated within a matrix scheme with assumptions that exceed the Marxist labor theory of value. In view of this, the theorem has received critiques from different theoretical perspectives. On the one hand, criticisms from neo-Ricardian and Neoclassical scholar sought to delegitimize the theory of value through the arguments of inconsistency and redundancy (Verbeke, 2019). In this case, they try to prove that the theorem does not hold. On the other hand, from contemporary Marxist currents such as the NI and the TSSI, which seek the theoretical roots of the theorem to develop it entirely within a Marxist theoretical framework. In doing so, the theorem is disconnected from the conceptual framework of orthodox general equilibrium models due to the conceptual shortcomings of the latter (Rieu, 2009; Yoshihara, 2017). These scholars try to strengthen the theorem, so it holds as generally as possible. For instance, Rieu examines the original FMT, and the NI and TSSI proposals that seek to expand the FMT, and warns that "each interpretation proves the fundamental Marxian theorem in its own way" (Rieu, 2009, p. 216). In the original formulation of the theorem, Morishima confuses the category of labor with labor power, uses nominal wages as *numeraire*, and assumes the theorem should work for the whole economy employing a widely-criticized uniform rate of profit (England, 1985; Yoshihara, 2017; Zhang, 2019; Basu, 2021). In general, Morishima disassociated the relational links between the social categories developed by Marx and their mathematical functional relationships (England, 1985). Even more serious is Morishima's misreading of the substance of value (Zhang, 2019, p. 290). Consequently, Morishima (1974, p. 73) went so far as to posit that the FMT can sustain

[22] In math terms, *causality is unequivocal* and does not admit reversibility.

[23] The proposed model is not based on the uniform profit rate but on multiple profit rates. In other words, there is not necessarily a redistribution of surplus value among capitalists. Each individual capitalist obtains profit according to the individual production conditions and the realization conditions. Competition between capitals implies there is no "average profit" assured for any capitalist, since the commodity still must validate.

[24] Under this scenario, the cost price presents three realization options. In the absence of profit, a commodity: i) sells at its market cost price, ii) sells below its market cost price or iii) does not sell (total realization problem).

without the labor theory of value. Nonetheless, as Basu (2021, p. 320) points out, the FMT is very important since "it establishes the tight link between exploitation and profits...[and] it does establish an indissoluble, qualitative link between the two: if there is no exploitation, there will be no profit". In this regard, the FMT must be treated within the theoretical framework of the theory of value (Zhang, 2019, p. 288). Let us show the attempts to *improve* the original FMT. One of the founders of the NI, Lipietz (1982) says the FMT is expressed correctly although its greatest weakness is that it fails to fulfill the invariance postulates. In the same sense, Basu (2021) affirms the FMT only posit a qualitative link between values and prices. As an alternative, the NI proposes to establish an invariance postulate. However, any invariance postulate is *arbitrarily* chosen, and it only allows conclusions for the aggregate level. Moreover, for NI proposal it is not necessarily true that positive profits results of positive exploitation (Rieu, 2009), neither at the aggregate level nor at the individual level. Meanwhile, in Kliman's (2007) proposal the TSSI attempts to account for real, not nominal, profit. In doing so, TSSI adopts a controversial definition of inflation and real profit to validate the FMT at a lower (concrete) level of abstraction (Rieu, 2009, p. 221). Nonetheless, new methodological problems appear within this approach, like the requirement of decreasing MELT to validate the FMT. Finally, Veneziani and Yoshihara (2015) present the so-called *Profit-Exploitation Correspondence Principle* (PECP). Yoshihara (2017) shows similarities and differences between the PECP and FMT. While the FMT formulates for the economy as a whole (for the aggregate level), the PECP comprises a correspondence between individual exploited workers and positive profits. However, the PECP has disadvantages compared to the FMT given the PECP admits exploitation "in an equilibrium with *zero* total *profit*" (Yoshihara, 2017, p. 1439, emphasis added). Then, once examined these proposals, it is proper to establish the conditions to satisfy the FMT within the proposed model. Accordingly, the theorem has a *necessary* and a *sufficient* condition. The necessary condition states for there to be a positive rate of profit there must be a positive rate of surplus value (Okishio, 1963). The sufficient condition states a positive rate of surplus value is enough to attain a positive rate of profit (Morishima, 1973, p. 53). As production and realization periods analyze separately, the FMT must be *reinterpreted* under this analytical framework. Consequently, given the source of profit must be found in the production process (Shaikh, 2007), the (positive) rate of surplus value, a *necessary condition* for a positive rate of profit, must be represented by *potential rate of surplus value*. Hence, a positive (realized) rate of profit attains only with a positive (potential) rate of surplus value, that is, exclusively through the exploitation of labor power. Likewise, the other variable to prove the necessary condition of the theorem is *realized rate of profit*. Regarding to the *sufficient condition*, attaining a positive realized rate of profit requires a positive realized rate of surplus value. Hence, a positive (realized) rate of profit attains only with a positive (realized) rate of surplus value, that is, exclusively through the sale of the commodity at a price above production costs. As above, the other variable to prove the sufficient condition of the theorem is *realized rate of profit*. Alternately, if potential rate of surplus value were employed, the FMT would guarantee *ex ante* surplus value realization, which is *absurd*. In this case, if realization problem arises so commodity does not validate profit, the FMT would not be satisfied. The PECP faces this issue since its sufficient condition is wrongly defined. So now, let us briefly review those difficulties Kliman and Yoshihara founded. Both approaches say the original FMT needs to be revised. On the one hand, TSSI affirms the necessity to apply the theorem to the concrete level. On the other hand, PECP focus on establishing individual links between exploited workers and positive profits. Then, both approaches find their own obstacles. However, these limitations do not apply for the proposed model. The definition of inflation and real profit as well as the coexistence of exploitation with zero profit are allowed and preserve internal coherence. There is no way to satisfy the sufficient condition of TFM other than by positive realized surplus value. Then, if we assume (positive) inflation the sufficient condition of FMT satisfies for the case of negative real profit (loss) given realized surplus value is zero. Moreover, if we assume there is exploitation (exploited workers) and zero profit realization, the sufficient condition of FMT satisfies as only positive realized surplus value enables positive profit realization[25]. These conclusions come from the definition of exploitation[26]. In regard, realized surplus value may be zero and coexist with positive exploitation. Then, no one should be afraid to affirm that an individual production process that *necessarily* involves exploitation, can give zero profit or losses. It is a game rule in capitalism, for any capitalist there is *no guaranteed profit* (Farjoun and Machover, 1983). Hence, the models should not suppress the *risk* involved in investing capital. Then, it is important to understand that *realization conditions* determines to what extent potential surplus value realizes and how it *materializes* into profit (Okishio, 1963: 293). Thus, the necessary (10) and sufficient (11) conditions of the FMT formally define as[27]:

$$\pi_r > 0 \quad \text{if and only if} \quad \mu_p > 0 \tag{10}$$

$$\pi_r > 0 \quad \text{if and only if} \quad \mu_r > 0 \tag{11}$$

To demonstrate the FMT, the relationship between rate of profit, rate of surplus value and the composition of capital presents next.

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[25] That is why Veneziani and Yoshihara (2015) do not find explanation for the inability of positive potential surplus value of transforming into positive realized surplus value.

[26] The point is establishing a coherent definition of exploitation and its links between surplus value creation and surplus value realization. An interesting insight was left by Yoshihara (2017, p. 1441, emphasis added): "these counterexamples should be viewed as representing the nonvalidity of the *presumed definitions* of exploitation".

[27] As presented in Morishima (1973), sufficient condition includes necessary condition.

$$\pi_r = \frac{\mu_r}{\left(1 + \frac{c_r}{v_r}\right)} \tag{12}$$

The *realized composition of capital* $(c_r/v_r)$ presents as a fixed ratio (see *infra*). Thus, realized rate of profit variations *exclusively* depends on realized rate of surplus value. Consequently, as FMT states, all profit comes *uniquely* from surplus value. One final thing to say on FMT. In the proposed model, there is no *uniform* rate of profit but multiple rates of profit that do not necessarily converge (Farjoun and Machover, 1983). Then, critics towards the average rate of profit on the FMT are inadequate here.

### 2.6. Cost price and capital destruction

Hence, it remains to analyze the *cost price* alternatives. *Potential cost price* $(k_p)$ composes of potential constant capital and potential variable capital. *Market cost price* $(k_m)$ composes of market constant capital and market variable capital. *Realized cost price* $(k_r)$ composes of realized constant capital and realized variable capital.

$$k_p = c_p + v_p \tag{13}$$

$$k_m = c_m + v_m \tag{14}$$

$$k_r = c_r + v_r \tag{15}$$

Although they are subject of quantification as *agglutinated mass* of capital, once commodity enters the realization period, it is not possible to examine *separately* the capital components of realized cost price. Under the traditional interpretation paradigm of Marxist labor theory of value, as long as realization problem is not introduced, it is assumed that potential cost price *equals* realized cost price, since commodity necessarily sells at a price above production costs, as Basu (2021, p. 309) claims. Then, under a simultaneous determination approach, there is no way to explain the possibility of temporal divergence between prices of capital inputs. In reality, there is a *temporal difference* between the start of a production process and its completion, and this concrete process requires a more complex explanation (Freeman and Carchedi, 1996). As TTSI and Macro-Monetary approaches explains, the price of capital inputs, which composes the cost price, may differ between one production period to another. Potential constant capital may differ from realized constant capital as well as potential variable capital from realized variable capital. However, any eventual variation would not alter the cost of production *ex post*. Assuming realization occurs during the current period as capital investment in the previous one, there is no chance to apply some retrospective variation in cost price components. Realized constant capital and realized variable capital are *social* categories configured in the realization period, once established (and afforded) the *individual* cost of production (at the beginning of the production process). Hence, the composition of capital must be analyzed through *potential cost price.* Under *money-capital circuit,* commodities present unified cost price components, that is, the total amount of capital becomes *undifferentiated* (Marx, 1993). Once production process has ended, commodity has homogenized its inputs. Then, it is not possible to decompose and analyze capital inputs individually. Moreover, analyzing cost price components under realization problem becomes complex since part or none of invested capital is *recovered*. For this reason, the realized cost price results *cryptic*. Despite this difficulty, the metamorphosis of the commodity sheds light on the process behind the formation of categories. In the beginning of the production process, money capital $M$ invests for purchasing inputs, namely, the *labor power* and the *means of production*, represented by $C$. As well as production process develops, commodity $C$ metamorphoses to obtain an *augmented* commodity $C'$, which carries with an augmented money capital $M'$. This is how capital reproduces itself over time (Marx, 1992). If capitalists fail to realize their commodities, they do not obtain the augmented capital $M'$. Then, due to realization conditions, capitalists are forced to keep $C'$ or to sell their commodities at lower prices than expected (Marx, 1993, p. 280). In case commodity does not sell, and if it is impossible to maintain its qualitative properties of use value (i.e., for being perishable), investment capital represented by potential cost price becomes an absolute loss. As shown *supra*, in Marx's writings there is a crucial *emphasis* on the passage $C' - M'$, the so-called *salto mortale* of the commodity. Nevertheless, Marx (1992, 1993) considers priority carrying out an analysis of the general conditions of production and circulation of commodities, under the *assumption* of customary realization. In change, the proposed model includes partial and total realization problem, as for capitalists both are *the most threatening* possibilities. Its consequences observe in non-surplus value realization and capital losses. As a result, to complete the presentation, it is necessary to introduce two categories, namely, *loss* and *loss rate*.

$$\Psi = k_p - w_r \tag{16}$$

*Loss* $(\Psi)$ measures, in absolute terms, the amount of capital that individual producer cannot recover. *Loss rate* $(t\Psi)$ measures, in relative terms, the portion of invested capital that individual producer cannot realize.

$$t\Psi = \frac{\Psi}{k_p} \tag{17}$$

Accordingly, for there to be (positive) loss and (positive) loss rate, potential cost price must be greater than realized value $(k_p > w_r)$. The amount of capital invested to start the production process comprehends the monetary expense individual capitalist *risks* for profit. Under partial realization problem, invested capital reali-

zes a rate of profit lower than expected, which results in *relative losses*. Under total realization problem, capital invested does not realize value, and there are *absolute losses*. Consequently, the introduction of these categories lines up with the concept of risk any capital assumes as it is thrown into the wheel of capitalist accumulation (Shaikh, 2007). Thus, the separated analysis of production and realization conditions, which studies the links between potential, market and realized categories, concludes here. Still, there is a final task left, which consist in analyze both periods together once for all, that is, analyze the direct links between potential and realized categories. In view of that, after setting both production and realization conditions, the *final scenario* for any individual producer presents as one of the following alternatives.

*I.* *Extraordinary scenario.* Realized value is above potential value. Surplus value realizes an extraordinary rate

$$(w_p < w_r\,;\; s_p < s_r\,;\; k_p = k_r\,;\; w_r > 0\,;\; k_r > 0).$$

*II.* *Potential scenario.* Realized value equals potential value. Realized surplus value is equal to potential surplus value.

$$(w_p = w_r;\; w_r > 0\,;\; s_p = s_r\,;\; k_p = k_r\,;\; k_r > 0).$$

*III.* *Below potential scenario*. Within this scenario there are three options:

- *and positive realized surplus value*. Realized value is below potential value. Realized surplus value is positive, but it is below potential surplus value.

$$(w_p > w_r\,;\; w_r > k_p\,;\; s_p > s_r\;;\; k_p = k_r\,;\; s_r > 0\,;\; k_r > 0).$$

- *and null realized surplus value.* Realized value is below potential value. Realized surplus value is null. Costs of production are fully recovered

$$(w_p > w_r\,;\; w_r = k_p\,;\; k_p = k_r\,;\; s_r = 0\,;\; k_r > 0).$$

- *and partial capital losses.* Realized value is below potential value. Realized cost price is below potential cost price. There are relative capital losses. Costs of production are partially recovered.

$$(w_p > w_r\,;\; w_r < k_p;\; k_p > k_r;\; w_r > 0\,;\; k_r > 0\,;\; \Psi > 0).$$

*IV.* *Non-realization scenario*. Realized value and realized cost price are null. There are absolute capital losses. Costs of production are not recovered

$$(w_p > w_r\,;\; w_r < k_p\,;\; k_p > k_r\,;\; w_r = 0\,;\; \Psi = k_p).$$

Loss and loss rate do not represent value destruction but *capital destruction*. Precisely, capital destruction refers to money capital accumulated during previous periods (Marx, 1992) that does not generate the same magnitude of money capital during the present production period.

Let us take again the metamorphosis of the commodity. Under realization problem, in the best-case commodity $C^{\uparrow}$ converts into $M$, that is, it barely allows to recover the capital investment. Even worst, if realization problem worsens $C^{\uparrow}$ converts into decreased $M_{\downarrow}$ and into nothing in the extreme case. The latter case shows complete capital destruction.

No value is destroyed given it never got the chance to full form. This distinction is crucial to define *stricto sensu* what *value creation* is and what *mediates* it.

## 3. Concluding remarks

Merely by accepting changes in some key categories, it is possible to develop a system of equations coherent with Marx's labor theory of value. This scheme is useful to explain the comprehensive formation of values and prices. The proposed model stands on a solution to the transformation problem of values into prices and overcomes the problem of circularity. Several contributions from diverse approaches are integrated here. Among others, some reviewed concepts are the SNLT, the MELT, the FMT, exploitation, superexploitation, and the realization problem. Let us try to sum up the main relations within these concepts. First, exploitation as well as superexploitation are rigorously studied. The proposed model offers an alternative reading on these two categories. Accordingly, initial investment pays for wages before starting the production period. As precondition to start the production process, labor power sells and realizes as commodity. Therefore, labor power value and its use value validate before the product of the worker's effort is finished. Labor power validation as use value implies exploitation (Rosdolski, 1977). In this sense, the proposed model goes further than others do since the former states exploitation should not measure using the rate of realized surplus value but the rate of potential surplus value. Hence, one of the most relevant conclusions is that there is exploitation *in every* capitalist production process regardless of realization conditions. On the other hand, based on Dussel (1985) the present proposal allows to explain the sub-period "between periods" of production and realization. This sub-period is important because it comprises the first conversion of values into prices through the so-called "tentative MELT". Furthermore, realization conditions determine profit scenarios. Then, it is possible to link exploitation and surplus value appropriation. To do so, from different perspectives the FMT examines. Known its importance for labor theory of value (Basu, 2021), satisfying the FMT should be a standard requirement for models based on Marxist theory of value (Verbeke, 2019). Its original elaboration by Okishio and Morishima reformulates so it fits to the proposed model. In addition, as shown above, dual determination of SNLT opens new perspectives for the periods of production and realization. Individual production conditions are important to establish tentative approximations to ASANLT. Nevertheless, social realization conditions are determinant to establish what is necessary. Realized values are actual values, those demand validates (May, 1948; Carchedi and de Haan, 1996). Hence, the unknown lies on realization of potential value. Consequently, potential val-

ues validate in extraordinary, expected, partial, or null proportion. Realization problem makes visible the risk commodities face in the market, the possibility of not being sold at all or being validated below market value (Marx, 1993). These scenarios drive toward an important conclusion. They call into question *vis-à-vis* the definition of the categories of value and use value. When commodity finds obstacles for realization, the concept of value and use value as full-formed categories cannot develop (Dussel, 1985). Likewise, prior to the sale, value category is latent as who is waiting to exist. Potential value indicates commodity has *potential use value* for its buyer. Commodity carries on utility *per se* (Marx, 1992), but its utility is just *potential*. Then, utility needs to validate in the market. If not, it would not be correct to denote *value* as the category to indicate commodity's potential content. Realization determines to what extent use value and value are socially necessary (Marx, 1992, p.179). Only when commodity validates, the substance of value materializes so *value becomes real* and takes on corporeality, it stops being in suspense. In other terms, a waiting stage ends as a completion stage begins. Henceforth, value acquires autonomy from its uncertain past, becomes independent from ties of waiting and crosses the chaotic labyrinth of market vicissitudes managing to avoid non-realization dangers. Commodity converts into money and completions money-capital circuit (Marx, 1993). Production and circulation processes are completed. Then, value is ready to start a new adventure in the accumulation process (Rosdolski, 1977). Consequently, now it is possible to answer the question about the "undefined category" wrongly identified with value as well as it is pertinent to redefine the category of value. In conclusion, preserving theoretical and methodological coherence it seems necessary to redefine realized value as *value,* and potential value as *prevalue*.

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