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**Demand, Values and Prices in Marx:
Contrasting Simultaneous and Temporal Approaches**

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Abstract: In this article I briefly contrast two single-system approaches to the integration of demand with a diachronic approach that integrates two meanings Marx develops for the term “socially necessary labor-time. I develop a one-commodity model of simple reproduction and use the model to illustrate how a change in aggregate demand from one period to the next affects the determination of value and exchange-value. I use the model to contrast the simultaneous single-system interpretation of the relationship between values and prices, which distinguishes market prices from prices of production, with the temporal single-system interpretation, which argues that market prices from the previous period determine values in the current period. I argue that the simultaneous approach is correct to claim that value and exchange-value are determined with reference to production and exchange in the current period; the temporal approach is correct to argue that in order to develop a *dynamic* theory of price adjustment using value categories, it is necessary to refer to value magnitudes from the previous period and to theorize how value is transferred temporally between periods. I show that by utilizing a diachronic approach and introducing demand in the manner Marx suggests in Chapter 10 of Volume III of *Capital*, it is possible consistently to model the relationship between value and exchange-value over time with variations in the level of demand. I conclude by identifying further conceptual developments needed to assess the three alternative approaches. Key Words: Value, Demand, Price Determination, Marx, Single-system

1. Introduction

Most theories of the relationship between value and exchange-value in Marxian economics do not explicitly consider how these categories are affected by changes in demand. Traditionally, demand is understood to affect values and exchange-values only

indirectly, by causing a deviation of market-prices from prices of production; the idea that demand can directly affect commodity values is rejected on the grounds that admitting such a role for demand would undermine Marx's claim that labor is the sole source of value (Rubin 1973). Alternatively, monetary theorists argue that value is determined through exchange (Gerstein 1977; Bellofiore 1989). Here, demand is understood to fully determine exchange-values by validating private independent labor as part of the social division of labor. I have argued elsewhere for an interpretation that recognizes a direct role for demand in determining value and exchange-value but which incorporates an important role for supply conditions in defining the range within which exchange-value can vary. By integrating two distinct meanings Marx introduces for the concept of socially necessary labor-time, it is possible to see that variations in demand directly affect commodity values and exchange-values and hence act to redistribute value among producers (Kristjanson-Gural 2003; 2005). Demand affects the magnitude of value directly because it acts to determine whether the private labor expended is "socially necessary" in the sense of being expended in accordance with existing social need. This insight has important implications for the question of how value is formed and introduces demand in a way that avoids conflating exchange-value and market price.

What I propose in this paper is the following. I analyze the affect of changes in aggregate demand from one period to the next on the values, exchange-values and prices of commodities using a one-commodity model of simple reproduction. I show how changes in demand act together with supply conditions to determine both values and exchange-values. In order to keep track of values in conditions where demand and supply are not assumed to coincide, it is necessary also to account for value that enters and leaves circulation through the formation of money hoards and commodity inventories. I then use this analysis to contrast the simultaneous determination of values and exchange-values originally provided

by Wolff, Callari and Roberts (1984) with a temporal approach developed by Kliman and McGlone (1996) to identify the differences between these two approaches.

This contribution is important for the following reasons. First and foremost it provides a simple, theoretic framework that can be used to evaluate the various attempts to theorize the relationship between value, exchange-value and prices in Marx. Second, it can provide a theoretic basis to analyze how different monetary systems (e.g. commodity money, fiat money, credit money) may affect the production and distribution of value. Finally, it provides a basis from which to evaluate contending approaches to the determination of the monetary expression of labor-time.

After briefly reviewing how demand affects value and exchange-value in a post-structuralist framework, I develop a one-commodity model of simple reproduction and use it to illustrate the determination of value and exchange-value when demand does not equal supply. I then use the model to contrast the simultaneous interpretation and temporal interpretations of the relationship between values and prices.

2. The role of demand in temporal and simultaneous approaches to value

Most treatments of demand in the value theory literature hold that short-run variations in demand lead to deviations between the market price of a commodity and its price of production; demand does not directly affect the magnitude of a commodity's value or exchange-value. In this view, the exchange-value (the market-value at the level of a single industry; the price of production at the level of competing industries) is defined either by the average technique of production (Roberts, 1997) or by the regulating capital (Shaikh, 1981). For Shaikh, exchange-value is fully defined by conditions of production, independently of demand and demand therefore affects the exchange-value of a commodity only indirectly.

Excess demand leads to a rise in the market-price above the exchange-value leading to a higher than average rate of profit for the industry inducing capital inflow. Capital inflow results in changes in the average or regulating technique of production and a resulting change in the exchange-value. In the simultaneous single-system approach developed by Wolff, Callari and Roberts (1984) and further elaborated by Roberts (1997; 2004; 2005), the value of constant capital is determined by the price of production of that capital in the current period. Exchange therefore, does play a role in the determination of value and exchange value, since the prices of production are determined with reference to the conditions of production along with an equivalence rule (in the analysis in Volume III) that each industry receives the average rate of profit. Variations in demand, however, are assumed to affect only market prices, which gravitate around these prices of production creating profit rates that deviate from the average and stimulating capital flows. Demand does not directly affect the determination of value or exchange-value in this approach.

Alternatively, a number of theorists hold that the exchange-value is fully determined by demand conditions (Eldred and Hanlon, 1981; Reuten, 1988; Bellofiore, 1989). According to this view, it is monetary exchange that validates labor expended in production as socially necessary and transforms concrete labor into abstract labor, the substance of value (Colletti, 1973). Demand in this view fully determines the value of the commodity. Kliman and McGlone (1996) implicitly accept this interpretation of the role of demand when they argue that the prices of constant capital in the previous period determine its value in the current period. This temporary single-system solution they propose, therefore, allows demand to fully determine the value of constant capital entering and leaving a given production period.

In contrast to these two approaches, I have argued elsewhere in favor of an alternative interpretation in which demand directly affects exchange-value but in which supply conditions define a range within which exchange-value can vary (Kristjanson-Gural 2003). This explanation, first offered by Rosdolsky (1954), relies on Marx's development of the concept of market-value in Chapter 10 of Volume III of *Capital*. Here Marx argues that variations in demand for a commodity first lead to a rise or fall in its market-value by affecting how much of the labor-time expended is considered 'socially necessary' in the sense of being expended in accordance with existing social need. Within limits defined by the conditions of production (the most and least efficient techniques), the market-value rises and falls along with the market price as demand varies relative to supply. Only when excess or deficient demand persists at a market-value defined by the most or least efficient techniques does the market price deviate from the market-value.

Should [the quantity produced] be smaller or greater, however, than the demand for them, there will be deviations of the market-price from the market-value. And the first deviation is that if the supply is too small, that *market-value* is always regulated by the commodities produced under the least favorable circumstances and, if the supply is too large, always by the commodities produced under the most favorable conditions; that therefore *it is one of the extremes which determines the market-value*, in spite of the fact that in accordance with the mere proportion of the commodity masses produced under different conditions, a different result should obtain. *If the difference between demand and the available quantity of the product is more considerable, the market-price will likewise be considerably above or below the market-value.*

(Marx 1959: 185-6, emphasis added)

In this reading of Marx, demand directly contributes to the determination of a commodity's exchange-value. It thus provides a means of defining value and exchange-value under conditions of non-market clearing. It also reconciles Marx's many statements that labor is validated as being part of the social whole, only through the act of exchange

This quantitative limit to the quota of social labor-time available for the various particular spheres of production is but a *more developed expression* of the law of

value in general, *although the necessary labor-time assumes a different meaning here*. Only just so much of it is required for the satisfaction of social needs. The limitation occurring here is due to the use-value. Society can use only so much of its total labor-time for this particular kind of product under prevailing condition of production.

(1959, p. 636)

In his development of the role of demand in Chapter 10, Marx states that this analysis of market-value applies to the price of production with the appropriate modifications, but he does not carry his analysis through to the level of competition among producers in different industries. In an earlier article, I follow Marx's suggestion, developing a new category of exchange-value, the market-price of production, a category that defines the socially necessary abstract labor-time represented by a commodity under conditions of excess or deficient demand, where *socially necessary* acquires the fuller meaning incorporating the market's evaluation of the social need for the commodities (Kristjanson-Gural, 2005).

This diachronic interpretation recognizes an evolution in the value category "exchange-value" as new contingencies are introduced into Marx's analysis in *Capital*.¹ Initially, value and exchange-value are assumed to be of equal magnitude since Marx's analysis focuses on a single-typical producer. With the introduction of competing producers in the same industry, the exchange-value evolves to "market-value" and Marx provides, in Chapter 10 of Volume III of *Capital*, a number of ways to determine a commodities market-value under different market conditions. With the introduction of competing industries, the price of production replaces the market-value as the relevant exchange-value provided demand and supply are assumed to be equal. With the introduction of variations in demand, Marx argues that the market-price of production becomes relevant (1959, p. 179; 198).²

As a further elaboration of the concept of exchange-value, the market-price of production occupies an intermediate position between the price of production and the market

price. The market-price of production and the market-price will rise and fall together within a range defined by the techniques of production of a given industry according to the level of demand. Outside that range, the market price will rise above the market-price of production in the case of extreme excess demand, and it will fall below the market-price of production in the case of extreme excess supply. When the market price and market-price of production are above the industry's price of production, it indicates that too little of the total social labor has been devoted to the production of that commodity. The industry will realize value that has been produced in industries with excess supply where labor has been expended in excess of what is considered socially necessary. Variations in demand among industries thus bring about a redistribution of value not simply through a deviation of market price from the exchange-value, but also by a change in the exchange-value itself, the amount of socially necessary abstract labor-time represented by the commodity in exchange.

In what follows, I want to defend the approach of integrating demand into the determination of value and exchange-value along the lines that Marx suggests in Chapter 10. I will argue that this interpretation of the role of demand differs from both the temporal and simultaneous approaches but incorporates insights from each approach. Specifically, it incorporates the argument from the temporal approach that the value of constant capital from the previous period plays an important role in understanding the dynamic adjustment of values and exchange-values. It incorporates the claim from the simultaneous approach that the production conditions in the current period together with the relevant equivalence rule determine the value and exchange-value of the commodities circulating in that period.

In order to simplify the analysis, I will use a one-commodity model that abstracts from the inter-industry competition that results in the formation of the price of production and the market-price of production since the affect of demand can be illustrated at the

industry level using the concept of the market-value. Thus, I will first develop, using the category of the market-value, a four-period schema of simple reproduction to illustrate the contending approaches.

3. A Model of Simple Reproduction

I want to be clear at the outset that I am not proposing a model to analyze concrete instances of capitalist competition; nor is the model an attempt to explain how demand arises, or how changes in demand are affected by a particular monetary regime. Instead I am utilizing a highly abstract and circumscribed model of simple reproduction to clarify the relationship between demand, value and prices by introducing a thought experiment that eliminates factors other than demand that might affect the magnitude of value. In my view it is necessary first to make clear the meanings of the concepts in this way in order, later, to be able to employ them in the further task of integrating other factors, such as the existence of credit, the type of money in use, other forms of monetary assets, each of which will impact both demand and producer responses to market conditions.

The model is designed to illustrate a shift of demand from one period to another period in a situation of simple reproduction with no attempt by producers to alter output. It is designed to illustrate how a normal change in demand can affect the quantity of value in a given period by affecting how much labor-time is socially necessary, without necessarily altering the total amount of value in existence over time. Demand can affect value and exchange-value directly without itself representing an independent source of value. Demand does, however, affect the value and exchange-value of commodities in a given period by altering the magnitude of value considered socially necessary. It therefore affects the exchange-value of capital and labor-power and the surplus value realized by capitalists and

the distribution of value between workers and owners. These changes can be theorized not as deviations of market-prices from exchange-values but as changes in the exchange-values themselves.

I support this claim by showing how the simplest possible change in demand, a shift of demand from one period to the next, affects the determination of the market-value over four periods. The model shows how the value of constant capital can enter a given production period as a magnitude of money representing a market-price and that this money magnitude is reconciled through exchange in the period to determine the exchange-value of the capital advanced. The value of constant capital in the previous period *is* relevant to the determination of value and exchange-value, but the determination of the value of constant capital is undertaken by reconciling, through exchange, the decisions of both producers and consumers in the current period.

I will identify three sources of variation in demand – workers consumption, capitalists’ consumption and capitalist reinvestment. I will show how the diachronic approach theorizes value entering and leaving money hoards and the change in the value of commodity inventories such that the total value over the four-periods is unchanged by the variation in demand. This example thus illustrates how demand, through the exchange process, can play a role in the determination of the commodity’s value without itself being a source of value.

I have constructed a schema of simple reproduction in which the only change that occurs is a variation in demand from one period to the next. I have deliberately eliminated complications that themselves may lead to a variation in the amount of value, such as changes in output and technology. I have also simplified the monetary system in order to avoid conflating the effect of changes in demand on the monetary expression of value with

the effect of monetary factors such as gold production, loans or other forms of money creation. Further analysis would, of course, incorporate these factors in order to analyze the effect each has on the trajectory of value and exchange-value, but for the purposes of the present argument, these complications are deliberately ignored.³

I consider four periods of simple reproduction in which the production of a single commodity is constant, and only the demand for the commodity varies. The reason for the variation is not important to the analysis, since only the affect of the change in demand is being analyzed. In each period, the same 4 hours of new labor is expended – two units of the commodity are used in production as constant capital and six units are produced overall. Exchange occurs at the end of each period when workers spend their wages to purchase output for consumption and capitalists purchase output for reinvestment and their own consumption. I assume that all surplus-value is consumed or saved within the period, i.e. there is no unproductive sector. To keep track of saving, I assume the worker and capitalist each have an initial money hoard containing \$1 representing one hour of value that are held as accounting balances in hoards outside of circulation. Workers can save their wages in these hoards; capitalists can also save in money when revenues exceed their expenditures. As stated above, the form money takes (commodity money, fiat money or credit money) is not important to the question of how demand affect the determination of value and exchange-value. For simplicity I will assume a non-commodity fiat money with two units in circulation with a velocity of money equal to three. This assumption implies that with six hours of value circulated by \$6 of money, \$1 initially represents 1 hour of value.

The model assumes that demand for this output equals the supply in Period 1 at \$6 or 6 hours. Demand falls by \$2 to \$4 in Period 2 due to workers and capitalists reducing personal consumption and withdrawing value from circulation. This \$2 is reintroduced in

Period 3 raising demand above the original \$6 to \$8 and demand returns to the original level of \$6 in Period 4 in order to restore the original circumstances to establish whether the shift in demand leads to a change in value overall. While six hours of abstract labor-time are present in each period (2 hours of constant capital and 4 hours of new labor), the concept of the market-value is used to keep track of the total *socially necessary* abstract labor-time expended in each period as demand rises and falls. That is, the market exchange that occurs at the end of the period validates the six hours of labor circulating in the period by measuring it relative to the demand existing in that period to determine how many hours are socially necessary. The socially necessary abstract labor-time determines the magnitude of value and exchange value.

The experiment is intentionally set up to model conditions under which one would expect no deviation in value, since no change has occurred to the production conditions and demand is restored to its original level in Period 4. The model thus permits the comparison of how the different approaches to integrating demand think about the process of adjustment when demand does not coincide with supply in order to clarify the conceptual differences underlying the alternative interpretations of value and exchange-value. It also will establish that, by itself, positing a direct role for demand in the determination of value and exchange-value does not necessarily imply that demand is an independent source of value. Finally, it provides a framework for introducing further contingencies and investigating how these affect the dynamic adjustment process.

Three specific possibilities are not included in the present analysis and it is helpful to clearly identify these up front in order to avoid confusion. For simplicity, I assume that the variation in demand is normal: it remains within the range defined by the techniques of production so that there is no deviation of market-price from market-value. Further analysis

will require distinguishing different producers with different techniques of production, establishing a range within which market-value can vary and demonstrating the determination of value and exchange-value when demand exceeds or falls short of supply when market-value equals the individual value of the least or most efficient technique.

Second, a one-commodity model abstracts from the breakdown of the output into different industries with differing compositions of capital and the calculation of the prices of production and market-prices of production. While the latter breakdown is important for analyzing how demand allocates value among producers within a given period and would be necessary to model changes in output levels in response to changing demand conditions. However, a one-commodity model is sufficient to contrast how the different approaches to demand theorize the determination of value and exchange-value.

Finally, I assume non-commodity fiat money is used to exchange the commodities and that money is neutral, i.e., the velocity of money adjusts with changes in demand so that there is no effect of variations in the supply of money on commodity exchanges. Using this simplifying assumption I abstract from the analysis of how the creation and management of money affects prices and values. Actual variations of demand in contemporary economies involve the creation of credit money prior to the production of commodities that the money is borrowed to finance, and consumer debt allows demand to vary independently of wages. These issues are important and also need to be explored, but they are beyond the scope of the current analysis since they do not bear directly on the question of how value and exchange-value are defined.

In order to contrast the different approaches to demand it is important to be as clear as possible concerning the assumptions governing exchange. I assume that the workers are paid money wages at the end of the current period, wages that correspond to the value of labor-

power from the previous period. This assumption reflects a monetary wage contract based on the wage being assumed to be equal to the value of labor-power, but it allows the money wage to deviate from the value of labor-power in a given period, as I will demonstrate below. In so doing, I limit the lag effect of the wage contract to one period in order to limit the distortions that would occur with a longer wage contract period. This choice also reflects Marx's argument that workers loan surplus-value to their employers since wages are paid at the end of the contracted period rather than at the outset. For simplicity, all capital is assumed to be circulating capital so that there is no fixed capital and no depreciation. I assume that capitalists respond to a change in demand by changing prices in the period to eliminate inventory accumulation – a pure price response. In general, producers respond to changes in demand through both quantity and price responses, but these are not needed to show the differences among the three approaches. Further, I will demonstrate that the capital and wages enter the period as money magnitudes representing a given magnitude of value from the previous period, but the current period's production and demand determine the exchange-value of constant and variable capital in the current period. The exchange-value of constant and variable capital will, in general, deviate from these initial money magnitudes and a transfer of value will thus occur.

In Table 1, the schema of simple reproduction shows the initial value in circulation and the two hours of stored value in money hoards. Six units of output worth six hours of value are created in the period. Of this value, two hours are used by capitalists to purchase two units of capital for the next period, two hours are used to pay workers who use their income at the end of the period to purchase two units for consumption, and two hours of surplus value are used by owners also to purchase consumption goods. On the left hand side is the breakdown of value into its component parts – constant capital (C), variable capital (V)

and surplus value (S) – the total value ($\sum W$), the total output (X) and the value and exchange-value of each unit (W_i).

On the left-hand side, Column 1 reflects the market price (P) of these components of value; Column 2 reflects the value and exchange-value (EV). Because we have only one commodity, the value and exchange-value are equivalents (there is no deviation of the exchange-value from the value since there is only one industry and one technique of production). Value and exchange-value can be expressed in either hours of socially necessary abstract labor-time or in money units. Because each hour of value is represented by \$1, this column can be read in both labor units and money units.

On the right hand side, I have recorded the income and expenses for workers and capitalists. Workers use two units of constant capital (worth 2 hours) to produce six units of output in the period (worth 6 hours). Four of the six units are consumed and two are reinvested. Workers receive \$2 in income (Y in column 3) in the form of wages and use it to purchase 2 units of output worth 2 hours for consumption (Cn in column 4). Capitalists receive \$6 in income in the form of revenue from the sale of the six units: they purchase 2 units worth \$2 for their own consumption, purchase two units worth \$2 for investment in constant capital (Ic in column 5) and two units for investment in variable capital (Iv in column 6) by paying workers their \$2 in wages. In addition to this value in circulation two hours of value is stored in money hoards - \$1 by workers and \$1 by capitalists (H in column 8). Assuming simple reproduction and no variation in demand, workers and capitalists are unable to save, so savings (Sv in column 7) in the initial period are zero for both.

There are two sources of demand – individual consumption by workers and capitalists (Co) and productive consumption – reinvestment in constant capital (Ic). There are two sources of revenue, wages for workers and sales revenue for capitalists. Both groups have

money hoards to finance increased consumption or to absorb unspent income. Any time consumption falls short of the \$6 or 6 hours of value produced there is deficient demand and prices fall to ensure all output is sold. When consumption rises above \$6 or 6 hours, there is excess demand and prices rises to clear the market.

In Table 2, I show the effect of a change in demand on the determination of prices, value and exchange-value in Period 2. Here, I simply assume that workers and capitalists reduce consumption in Period 2 by one third. The motivation for, and amount of, this reduction is not important for this analysis because the point is not to model how capitalists or workers are likely to respond to such changes; I simply wish to show the effect of such a change on the determination of value and exchange-value. Reducing consumption and reinvestment demand causes prices and redistributes value between capitalists and workers.

The timing of these decisions is important. By assumption, production in each period is unchanged – six units of output continue to be produced. Thus, capitalists have purchased two units of constant capital from period 1 for \$2 and contracted with workers to work four hours for \$2 in wages. But at the end of Period 2, capitalists are unable to sell the six units of output at the price of \$1/unit due to the reduction in demand. In order to sell all output produced, they must lower prices by one third to \$ 0.67/unit and they thus receive only \$4 in total revenue. These money prices are reflected in Column 2 of Table 2. Note the assumption of the pure price response implies that all 6 units are sold at prices that reflect the lower level of demand.

What happens to value and exchange-value as a result of the reduction in demand? Here is where the interpretation of Marx's Chapter 10 of *Capital* comes into play. Rather than having prices deviate from market-values (assumed to be determined solely by conditions of production), the market-value falls in tandem with the market-price to reflect

the fact that some labor expended in the period is not socially necessary in the sense of being expended in accordance with existing social need. Producers are caught together and hung together. When workers and capitalists reduce consumption, they signal that not all the labor-time expended in the period is socially necessary in this global sense and that fact needs to be reflected in the determination of the commodity's value and exchange-value. Thus the value of the commodity falls with the reduction in demand to 67 cents and for the six units produced overall only four hours of labor-time is socially necessary and thus only four hours of total value is created in the period. Column 2 apportions this value by the three components of commodity value. Although \$2 was advanced for constant capital, that constant capital turns out, after accounting for demand, to be worth only \$1.33 or 1.33 hours of socially necessary labor-time. The market price of capital in the period of \$2 is therefore above the value and exchange-value reflected in the market-value of the constant capital employed of \$1.33 or 1.33 hours. Similarly, the wage of \$2 is above the value and exchange-value of labor-power, which has fallen to \$1.33 or 1.33 hours. 1.33 hours of surplus value has been generated, but capitalists appropriate no surplus value in the period in money terms due to the fall in exchange-value of output and the resulting reduction in their sales revenue. This value is not lost however; it is allocated between the workers, who receive wages of \$2 that are above the value of their labor-power of \$1.33 and thus receive \$0.67 of additional value, and the capitalists themselves who are able to buy constant capital for the next production period at a lower value price - \$1.33 and thus receive \$0.67.

In terms of revenue and expenses, capitalists receive \$4 or 4 hours of revenue, spending \$1.33 or 1.33 hours on two units of output for their own consumption, they purchase two units for \$1.33 or 1.33 hours for use as constant capital in period 3 and pay \$2 or two hours in wages to workers as specified in the wage contract they issued at the outset of

the period based on value of labor-power in the previous period – Period 1. Capitalists thus must draw down savings by \$0.67 or .67 hours reducing their hoards to \$0.33. Workers receive \$2 or two hours of wage revenue at the end of the period but spend only \$1.33 or 1.33 hours on 2 units of the output due to its lower price. Workers save the remaining income so that their money hoards rise by \$.67 or .67 hours to \$1.67. Workers thus benefit from the fall in demand as their real wages rise while capitalists lose due to the lower revenue they receive, revenue that is not entirely offset by increased purchasing power due to lower prices.

Note that the reduction in value and exchange-value in the period is matched by the reduction in money needed for individual and productive consumption. Four hours of value is socially necessary in the period and \$4 of money is now needed to purchase wage goods, capitalist consumption goods and constant capital for the next period. Since money is assumed to be neutral, the velocity of money falls to 2 to reflect the lower prices. The ratio of total value to total money in circulation is therefore constant at \$1/hour and the magnitudes in Table 2, columns 2-8 continue to represent both labor-hours and currency units.⁴

In order to account for the value allocation that occurs in the period, even under these very restrictive assumptions, two sets of accounts are needed. The first set keeps track of the money wages paid and the money revenues received from the sale of the output. As long as wages are, by assumption, fixed by a wage contract based on the past period's value of labor power (the simplest assumption consistent with a capitalist wage contract), money wages and revenues will deviate from exchange-values. Exchange-values are determined on the basis of the current period's production reconciled with the level of effective demand. The determination of value is needed to show what reallocation of value, in money and in labor

hours, occurs due to the reconciliation of producer's decisions concerning output and the level of social need expressed for that output in exchange.

Even after two periods, this simplified model thus makes it possible to see the differences among the temporal and simultaneous approaches. The temporal approach argues that market exchange validates private labor as social labor. The money prices of wages and constant capital in Period 2 are determined by production and exchange conditions in Period 1. These price magnitudes thus enter Period 2 as values. Exchange in the previous period thus determines value magnitudes in the current period adding a temporal dimension to the analysis. On the other hand, the simultaneous single system approach argues that the variation in demand affects only market prices, not values and exchange-values. It therefore continues to define the value of labor power according to the prices of production of the wage goods that workers consume and calculates the re-allocation of value between workers and capitalists according to the deviation of the market prices of constant and variable capital and their exchange-values. The diachronic approach argues that the exchange-value of labor-power and constant capital is affected by demand in the current period according to the level of demand. Normal variations in demand result in a reduction in the labor-time considered socially necessary and a redistribution of value. Only extreme variations in demand result in deviations of market-prices from exchange values.

In Period 3 (Table 3), I assume demand rebounds from \$4 to \$8 going from 33% below to 33% above the \$6 needed to maintain simple reproduction. As before, two units of constant capital are purchased in the prior period at its existing value (\$1.33) and workers wages are set at the value of labor-power, which fell in the period 2 to \$1.33. Column 1 shows the breakdown of total revenue in term of market prices. Total revenue is now \$8 due to the increase in demand, but capital advanced (C+V) is only \$2.67. Capitalists therefore

realize a money profit of \$5.33. When exchange occurs at the end of the period, the higher demand implies that the value and exchange-value of the output is greater than the labor-time that workers expend in the period. More labor is socially necessary in the period than has been expended in the period. Each of the six units of output is thus worth 1.33 hours of value. The two units of constant and variable capital are thus worth 1.33 hours each or \$2.67 in total and 2.67 hours of surplus value is produced.

The distribution of this income is shown on the right hand side of the table. Capitalists receive \$8 or 8 hours of revenue due to the higher price and exchange-value of the output. Workers on the other hand, receive only \$1.33 or 1.33 hours of wage income due to the lower value of labor-power at the end of Period 2. Workers purchase 2 units as before at \$1.33 each but have to withdraw \$1.33 from savings to make up for their low wages leaving their money hoards at \$0.33. Capitalists devote \$2.67 to the purchase of constant capital for the following period. They pay \$1.33 in wages to workers based on the wage contract negotiated in Period 2. They spend \$2.67 on consumption of two units at the higher price and value prevailing in the current period and are able to save \$1.33 to bring hoards up to \$1.67 or 1.67 hours.

Now the increase in value and exchange-value in the period is matched by the increase in money needed for individual and productive consumption. Eight hours of value is socially necessary in the period and \$2 of fiat money circulates four times to purchase wage goods, capitalist consumption goods and constant capital for the next period. The ratio of total value to total money in circulation is therefore constant and \$1/hour and the magnitudes in Table 3, columns 2-8 continue to represent both labor-hours and currency.

I assume demand returns to normal in Period 4 (Table 4) and the six hours of labor expended are now all socially necessary. Because the wage rate and the price of constant

capital are still based on the previous period, the revenue for workers and the expenses for capitalists are still higher than in Period 1. Accordingly, the savings for workers are replenished and the savings for capitalists are drawn down so that the hoards return to their previous levels. With no more changes in demand, the original magnitudes inherent in the model of simple reproduction are restored in Period 5 (Table 5) with no further changes to money hoards. The variation in demand has not resulted in any change to the magnitude of value over the five periods.

4. Contrasting simultaneous and temporary single-system approaches

Three results are apparent from the example above. First, I have shown that the interpretation of the effect of demand on market-value in Chapter 10 of Marx, provides a consistent means to track the effect of changes in demand on commodity value/exchange-value and market prices that is distinct from the temporal and simultaneous explanations.

The exchange-values of both constant and variable capital are determined in the current period according to both conditions of demand and supply. At the same time, the exchange-value of capital from the previous period determines the revenues and costs of workers and capitalists and is therefore necessary for developing a dynamic analysis of prices and values. In each period the revenue is determined by demand; the money cost of capital and labor-power are determined by the exchange-value of capital in the previous period. Exchange in the current period converts this private, independent labor to abstract, socially necessary labor-time expressed as the value and exchange-value of the commodity. Demand directly determines the magnitude of value and exchange-value. Other assumptions concerning the determination of wages and the inclusion of fixed and circulating capital will change the dynamic adjustment process, but this schema of simple reproduction is sufficient

to show that including a role for demand in the determination of value and exchange-value does not necessarily imply that demand represents an independent source of value.

Second, the experiment helps to reveal more clearly the differences between the temporal and simultaneous single system approaches to value. The temporal single system theorists have the merit of recognizing the demand does directly affect the magnitude of value and exchange-value. However, they do not distinguish the market-price of constant and variable capital from the exchange-values of these components and thus mistakenly claim that the *value* of these two categories is determined in the prior period – a historical or temporal determination of value. This interpretation runs counter to Marx’s argument that current changes in techniques of production change the value of existing stocks of capital. Further analysis that incorporates extreme shifts in demand that result in deviations of market-prices from exchange-values are ruled out by this approach since demand fully determines exchange-value independently of supply conditions.

On the other hand, the simultaneous single system interpretation has the merit of recognizing that the conditions of production in the current period along with the equivalence rule together act to define both value and exchange-value. However this approach limits the role of demand to the determination of market-prices because it continues to utilize an equivalence rule to determine exchange-value that does not incorporate how demand alters how much of the labor expended is socially necessary in the second sense. In the one-commodity world of my example, the single system interpretation would treat the rule for equivalent exchange in Marx’s volume 1 fashion, as exchange *at value*, where per-unit value is treated as unaffected by demand and remains at the initial period 1 level (\$1, or 1 hour) throughout. I argue that that rule is modified when demand deviates from supply in order to incorporate the fact that some of the labor expended exceeds or falls short of what is socially

necessary. One hour no longer represents the amount of *socially necessary* abstract labor-time, so the value of the commodity itself varies. The simultaneous single system approach does not, therefore, integrate the second meaning of socially necessary labor-time, nor the analysis that Marx develops in Chapter 10 of Volume 3 of *Capital* in which he provides examples to explain how changes in demand affect exchange-values.

The present interpretation of the role of demand demonstrates that demand can directly determine the magnitude of value and exchange-value in a given period without conflating market-price and market-value and without necessarily implying that demand is an independent source of value. It has the additional merit of integrating the second meaning Marx attributes to “socially necessary labor-time” and incorporates his of how demand affects exchange-value in Chapter 10 of Volume III of *Capital*.

5. Conclusion

Using the concept of the market-price of production, I have illustrated how changes in demand affect value and exchange value from one period to the next. I demonstrate that including a direct role for demand does not necessarily imply that demand is an independent source of value. I argue that by including the effect of demand on validating labor as ‘socially necessary’ is it possible consistently to define the value and exchange-value when demand deviates from supply and thus to show how demand redistributes value between periods. I then contrast this diachronic approach with two other attempts to theorize the determination of value and exchange-value in a single-system approach to value – a temporal and a simultaneous approach – and I identify key theoretic differences among these three approaches.

In developing the numerical example above, I imposed a number of restrictive assumptions in order to isolate the effect of demand. Further research is needed to explore the implications of relaxing these restrictive assumptions. One important implication of my argument is that each approach implies a different approach to integrating the monetary expression of value – the means by which socially necessary abstract labor-time is converted and expressed in money units. Comparing how each approach defines and deploys the monetary expression of value will allow a more complete assessment of the relative merits of each approach. Further research will also permit the integration of new contingencies resulting in an elaboration of how monetary and financial factors affect values and exchange-values generating greater insight into the dynamics of capitalist competition and the distribution of society's paid labor-time.

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Table 1:
Period 1

	\$P	EV (\$;Hr)		Y	Cn	Ic	Iv	Sv	H
C	2	2	Workers	2	2	0	0	0	1
V	2	2							
S	2	2							
ΣW	6	6	Capitalists	6	2	2	2	0	1
X	6	6							
Wi	1	1							

Table 2:
Period 2

	\$P	EV (\$;Hr)		Y	Cn	Ic	Iv	Sv	H
C	2	1.33	Workers	2	1.33	0	0	0.67	1.67
V	2	1.33							
S	0	1.33							
ΣW	4	4	Capitalists	4	1.33	1.33	2	-0.67	0.33
X	6	6							
Wi	0.67	0.67							

Table 3:
Period 3

	\$P	EV (\$;Hr)		Y	Cn	Ic	Iv	Sv	H
C	1.33	2.67	Workers	1.3	2.67	0	0	-1.33	0.33
V	1.33	2.67							
S	5.33	2.67							
ΣW	8	8	Capitalists	8	2.67	2.67	1.33	1.33	1.67
X	6	6							
Wi	1.33	1.33							

Table 4:
Period 4

	\$P	\$/hrEV		Y	Cn	Ic	Iv	Sv	H
C	2.67	2	Workers	2.67	2	0	0	0.67	1
V	2.67	2							
S	0.67	2							
ΣW	6	6	Capitalists	6	2	2	2.67	-0.67	1
X	6	6							
Wi	1	1							

Table 5:
Period 5

	\$P	\$/hrEV		Y	Cn	Ic	Iv	Sv	H
C	2	2	Workers	2	2	0	0	0	1
V	2	2							
S	2	2							
ΣW	6	6	Capitalists	6	2	2	2	0	1
X	6	6							
Wi	1	1							

Notes:

¹ Value is the socially necessary abstract labor-time required to produce a commodity; exchange-value is the quantity of socially necessary abstract labor-time that the commodity represents in equivalent exchange. As new contingencies are introduced into the analysis, such as the consideration of competing industries and, later the introduction of variations in demand, the socially necessary abstract labor represented in exchange changes and the exchange-value evolves from market-value to price of production to market-price of production. Because the exchange-value determines the value represented by constant capital and variable capital, the value of any given commodity also changes with these new contingencies. See Kristjanson-Gural 2009.

² For clarity, I distinguish the market-price - an average selling price over a given period of time – from an individual price – a price accruing to a particular capital from the sale of their output at a given time. The market-price is a money magnitude determined by the prevailing conditions of demand and supply. It is distinct from the exchange-value because the range of the techniques of production does not limit its movement.

³ The schema of reproduction is constructed to illustrate a self-correcting demand shift within a normal range that does not affect production conditions. I do not explore in this article the question of what might prevent or enable persistent excess demand and whether there are conditions under which such demand results in sustained increases in socially necessary labor-time. I cannot therefore rule out the possibility that this approach implies that demand can under certain circumstances alter the total amount of value over time. Addressing that question would require an analysis of how persistent levels of excess demand are financed which is beyond the scope of the current argument. Here I am simply claiming that introducing demand does not necessarily imply that demand creates value.

⁴ This feature of the present example provides a means to contrast and evaluate different attempts to formulate the monetary expression of value, an investigation that will be undertaken in future work. For an initial discussion of the issue see Kristjanson-Gural 2008.