

# Rethinking Demand: A Non-Equilibrium Approach to Value and Price

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## A. Introduction

The effort to cultivate and sustain consumer demand represents an important aspect of competition and has a significant impact on the determination of prices and profit. Marxian value theory, with its emphasis on class analysis and the effect of social and institutional factors on human behavior, ought to be at the forefront of theorizing the effect of demand on the determination of prices as well as the distribution of value in the economy. The analysis of demand however, remains a largely underdeveloped area of Marxian research; the integration into the theory of the determination of prices and values remains problematic.

Two reasons for the curious underdevelopment of the Marxian theory of demand are evident. The first is the well-known difficulty within Marxian value theory of explaining how prices are related to values. Critics of Marxian value theory have long argued that the most widely accepted definition of value is inconsistent with Marx's claim that profit results from surplus value. The dual equality of total price and total value along with total surplus value and total profit cannot hold simultaneously.<sup>1</sup> If prices cannot be explained on the basis of values, there is little point in pursuing the effects of changes in demand. Recent scholarship, however, has challenged the interpretation of value on which this critique is based. It provides a new interpretation of the value of commodities which eliminates the inconsistency between the two equalities and provides an understanding of the relationship between values and prices which is sound and compelling.<sup>2</sup> The path to the elaboration of the theory of demand has been cleared of this longstanding road block.

A second obstacle to the integration of demand concerns the explanation of the effect that a change in demand has on the value of a commodity and its price. Two tendencies exist in the

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<sup>1</sup> For an overview of the debate concerning the transformation problem see Glick and Ehrbar (1987).

literature and from the current perspective neither is satisfactory. Traditionally, supply conditions have been given precedence in the determination of value and exchange value over those of demand. Demand can affect the magnitude of value only indirectly, by affecting the producers' decisions concerning the conditions of production. This approach to demand, by ascribing the direct affect of changes in demand to prices, theorizes values as long-run points of reference for values. While this is useful for addressing some questions, value analysis becomes irrelevant to the study of short-run changes in prices and the distribution of value which results from shifts in the distribution of demand among industries.<sup>3</sup>

Recent work in Marxian monetary theory does give demand a direct role in the determination of value, but in so doing, undermines the role for supply conditions. According to this approach, money prices are expressions of value which vary directly with changes in demand and which can be converted from money units into quantities of labor-time through the proper specification of the value of money. However, within each industry, the conditions of production become irrelevant to the determination of commodity values.<sup>4</sup> The challenge faced by Marxian theory is how to integrate demand in such a way that the conditions of production retain their role in the determination of value and demand conditions are given a meaningful role.

Surprisingly, such a solution to the integration of demand has existed in the literature for approximately 50 years. Rosdolski (1954) provides an interpretation concerning the integration of demand in the determination of value which integrates both demand and supply conditions in the determination of commodity values. The significance of Rosdolski's work has been

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<sup>2</sup> This interpretation was first provided by Wolff, Callari and Roberts (1984). For a recent elaboration see Roberts (1997).

<sup>3</sup> See Semmler (1984) for a good discussion of the limitations of this approach to value for the analysis of short-run adjustment processes.

<sup>4</sup> Mohun (1994) attempts to show how market-prices can be converted into values using the value of money. Since the value of money is defined with reference to the net product, but the money prices include elements of constant capital, this attempt to integrate demand is ultimately unsuccessful.

overlooked in part because of the attention given to the transformation problem and in part because a full exposition of the role of demand requires the resolution of that debate. Now that such a resolution is available, the problem of the integration of demand can be resolved.

Since this solution to the relationship between value and prices is not well known, it will be helpful to begin by clarifying this key relationship. In so doing it will become evident that the difference between the two magnitudes, far from being a discrepancy, is the means by which the theory analyses how competition affects the distribution of value throughout an economy. The next section shows an algebraic solution to the relationship and provides a simple, two industry, two producer model to illustrate the distribution of value and physical quantities. This model will then be extended to include within the first industry, two distinct techniques of production. The analysis of different techniques of production, largely overlooked in the literature, is key to the integration of demand.

The third section uses the model to illustrate the determination of value and exchange value under conditions of excess and deficient demand. Here, the insights of Rosdolski's interpretation, which apply to competition within an industry, will be applied to competition among producers within and across industries for the first time. A new category of exchange value, the market-price of production, is developed and used to show how changes in demand affect the determination of value and exchange value and how value is redistributed among producers as a result of a shift in demand.

The final section of the paper will discuss some of the implications of the integration of demand and outline avenues for further research.

## B. Value and Exchange Value

A key insight which provides a resolution to the longstanding problem of transforming value into exchange value lies in the interpretation of value itself. Traditionally, value has been taken to be the quantity of abstract labor-time socially necessary (i.e. required on average) to produce one unit of a given commodity. It is determined by adding the new labor requirement to the quantity of labor-time required to produce the consumed means of production.

Algebraically,

$$(1) V=VA+L$$

Where  $V$ =row vector of labor values

$A$ = $n*m$  matrix of commodity inputs per unit output

$L$ =column vector of new labor inputs per unit output

Exchange value, which in the case of more than one industry takes the form of the price of production, is understood to be the relative price at which a commodity must exchange in order for the industry to receive an equal average rate of profit. It is found by multiplying the cost price (the sum of constant and variable capital advanced) by one plus the economy wide average rate of profit. Hence,

$$(2) P=P[A+BL](1+r)$$

Where  $P$ =row vector of production prices

$B$ =row vector of wage goods advanced per hour

$r$ = scalar rate of profit

When defined in this way, if the sum of values equals the sum of prices of production, then the sum of surplus values will not, in general, equal the sum of profits and a central claim of the theory of value is undermined. Profit does not result solely from the expenditure of unpaid labor-time in production.

A question raised by the recent literature is this: given that exchange occurs on the basis of prices of production and not values, how is the value transferred by the constant capital component to be evaluated when calculating a commodity's value. This question goes to the heart of value theory because it asks us to reconsider what it is we mean by "value". What quantity of labor-time is required on average to produce a commodity? The answer given is that the means of production should be evaluated not at their values, as suggested by (1) above, since they must be purchased at their prices of production. The price of production is therefore a constituent element of the value of the commodity.<sup>5</sup> Algebraically, (1) is replaced by (1b)  $V=PA+L$

The following question immediately arises: how can the labor time required to produce a commodity depend upon a price? The second insight of this approach is the recognition that both value and price of production are quantities of (socially necessary) abstract labor that can be expressed in both labor units and money units. What then is the theoretic content of the two? The value is simply the quantity of socially necessary abstract labor-time required to produce the commodity. The price of production is the quantity of such labor which that commodity will receive in equivalent exchange, i.e. an exchange which will give the producer a rate of profit equal to the industry-wide average. Both magnitudes can be converted into money magnitudes using an expression for the value of money.<sup>6</sup> The transformation of value into price of production is not a transformation from labor magnitudes in to price magnitudes; it is a

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<sup>5</sup> A number of theorists have come to accept this conclusion. See Wolff, Callari and Roberts (1984), Carchedi (1991), Moseley (1993), McGlone and Kliman (1996), Freeman (1996), and Roberts (1997) among others. The justification for this interpretation differs. The argument presented here follows most closely the line of thinking developed by Roberts.

<sup>6</sup> In the case of commodity money, this relation would be given by the exchange value of gold; in the case of a non-commodity money it is most often defined as a ratio between the value of the net output and the value-added in currency units. Since money magnitudes are not necessary to the exposition of the current argument the analysis will use only labor units. The integration of demand does shed some light on the controversy surrounding how the value of credit money should be conceptualized. Some comments on this question are provided in the final section.

comparison of the abstract labor socially necessary to produce a commodity with the quantity of such labor that the commodity represents in equivalent exchange (Roberts 1997). The difference between the two magnitudes shows how, given a tendency for profit rate equalization, the process of exchange acts to distribute value away from those industries which are relatively more labor intensive toward those that are more capital intensive. The measure of an industry's relative labor intensity, the organic composition of capital, is determined by the ratio of the value of variable capital to total capital advanced. Only in the case of an industry with an average organic composition of capital will the value equal the price of production indicating that the expended in the industry is just equal to the amount of value the commodity represents in equivalent exchange. The theoretic significance of the two value categories, therefore, is to show how the equalization of the rate of profit results in the redistribution of value from industries with lower than average organic compositions to those with higher through the process of exchange. The theory of value and prices is not simply a theory of how prices are determined, although it is that, it is at the same time a theory of how the capitalist markets distribute society's labor-time.<sup>7</sup>

The following model has been developed in order to illustrate the determination of value and price of production and to show how the distribution of value can be theorized with reference to the relationship between the two categories.<sup>8</sup> It describes a situation of simple reproduction involving two producers producing two commodities – A and B. One unit of each commodity are used to produce 18 units of A and 2 units of each commodity are use to produce

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<sup>7</sup> Steedman's charge concerning the redundancy of value for the determination of prices is, from this point of view, a misunderstanding concerning the purpose of the theory of value. Without the category of value, the distribution of social labor through competition cannot be shown.

<sup>8</sup> The model is intended to help define and explain the theoretic meaning of the categories value and price of production and not to represent an actual production process occurring in historic time. The concepts themselves require considerable theoretic development before being used to theorize the changes occurring in any existing economy.

6 units of B. This defines X, the vector of gross output, Y the vector of net output and A, the matrix of physical production data, as follows:

$$X = \begin{bmatrix} 18 \\ 6 \end{bmatrix} \quad Y = \begin{bmatrix} 15 \\ 6 \end{bmatrix} \quad A = \begin{bmatrix} 1/18 & 2/6 \\ 1/18 & 2/6 \end{bmatrix}$$

The workers perform 24 hours of labor-time and receive half the net output, 7.5A and 1.5B, as wages.<sup>9</sup> The remaining half is consumed by owners. Vector b shows the units received per hour of labor performed, L the labor performed per unit of output produced and bL the units received by workers per unit of output produced.

$$b = \begin{bmatrix} 7.5/24 \\ 1.5/24 \end{bmatrix} \quad L = \begin{bmatrix} 16/18 & 8/6 \end{bmatrix} \quad bL = \begin{bmatrix} 5/18 & 2/6 \\ 2/18 & .5/6 \end{bmatrix}$$

Table 1 below shows a distribution of physical units of output which is consistent with this data. Column 1 shows the units of A and B (written A:B) used as constant capital in each industry and the total (A+B). Column 2 shows use of variable capital, which corresponds to the consumption of A and B by workers in the wage bundle. Column 3 shows the surplus created in each industry. It provides one possible distribution of surplus product to owners given an equal rate of exploitation of 100%. Column 4 sums the elements in Columns 1-3 to show the total value attributed to producers in each industry. The total output produced in the period is thus accounted for in the consumption of workers, owners or used in the production process in accordance with the assumption of simple reproduction.

Insert Table #1

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<sup>9</sup> For simplicity labor is assumed to be homogeneous. For a discussion of the integration of heterogeneous labor, see Roberts (1995).

Having thus accounted for the physical units of output, the next step is to solve for the values and exchange values of the two commodities. From equation (2) above, we can solve for the prices of production, the quantities of socially necessary abstract labor each commodity represents in equivalent exchange. Using the net product normalization, i.e. assuming that the sum of the new socially necessary abstract labor-time produced (PY) equals the sum of the new labor expended (LX) we find  $P=[1 \ 3]$ . From equation (1b) above we can then determine the values,  $V=[1.11 \ 2.66]$ , the quantity of abstract labor socially necessary to produce each commodity.

The difference between the value and the price of production denotes the gain or loss in value incurred as a result of the tendency for rates of profit to be equalized across the two industries. Industry A loses .11 hours per unit or 2 hours in total as a result of exchanging at a price of production below its value. Industry 2 gains this 2 hours of value as a result of exchanging each of its 6 units at .33 hours above the value. Two hours of social labor thus are redistributed from A, the relatively labor intensive industry, to B as the result of the equalization of the rate of profit.

In Table 2, below, the physical units of output are converted to units of socially necessary abstract labor-time. The first four columns correspond to those of Table 1 above. Here the units are valued at their prices of production to show the socially necessary abstract labor-time represented by each physical unit. In column 4 the total value represented by the output in each industry is given. The 18 units of A at 1.11 hours each, have a total value of 20 hours; industry B produces 6 units at 2.66 hours each or 16 hours of value. The total prices of production (PP) in Column 5 show the amount for which each industry's total output exchanges when profit rates are equalized. It shows that the total output in each industry is worth 18 hours

of labor-time in exchange. The final column shows the transfer of value from A to B as a result of exchange.

Insert Table #2

The model thus illustrates that the relationship between value and exchange value, far from being problematic, is the means by which Marx resolves the contradiction between value in use and value in exchange.<sup>10</sup> Defining the value of each commodity – the socially necessary abstract labor-time required in production—with reference to the exchange value of the inputs into production is the key to understanding how these two important value concepts are inter-related.

## 2. Competition Within an Industry

There is however, one other aspect of the relationship between value and exchange value which must be examined in order to set the stage for the introduction of demand. In the absence of product differentiation, there will exist a tendency for the output of different producers within an industry to exchange at the same exchange value. At the same time the existence of different techniques of production within an industry implies that the labor requirements for each producer will vary. Each producer within an industry will therefore produce with a different quantity of abstract labor-time (the individual value) and thus earn a different rate of profit. By

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<sup>10</sup> An image used repeatedly throughout *Capital* to describe this process is the idea of the aliquot share. Here, because both A and B advance the same value of capital (C+V), it is easy to see that they each receive the same aliquot share (6 hours) of the total surplus value produced (12 hours). Roberts (1997) provides an exposition of the distribution of surplus value on the basis of capital advanced using a physical quantities approach. Since both value and exchange value can be derived from the physical production data, value is not “dependent upon” exchange value.

reducing the individual value of their output below the average value, each producer strives to capture a super profit – a rate of profit above the industry average. Competition within an industry thus results in a distribution of value from less efficient to more efficient producers through the formation of the exchange value. Differences among techniques of production within an industry are often abstracted from in the effort to simplify or to meet the requirements of matrix algebra. Here it is argued that this abstraction has been a major stumbling block to the integration of demand.

In order to incorporate this dimension of competition into the model, the production process in industry A has been divided between two producers. 60% of the constant capital in industry A has been assigned to producer 1 and the remaining 40% to producer 2. The variable capital and surplus produced is assigned to each technique equally. Producer 1 is assumed to produce 11 units output with the remaining 7 units credited to producer 2. This division of the output has two advantages. First it reflects Marx’s assumption that by adopting more capital intensive means of production, producers within an industry can increase the number of units produced in a period and reduce the individual value of their output below the industry average. In so doing they create the opportunity to capture a super profit. Secondly, since the output in industry A is unaffected by these changes, the prices of production and values remain unchanged. The results from table 2 can therefore be used as a point of reference for the analysis.

The result is a system of three production processes which can be described by the following expanded system of equations.

$$(3) P(A^x + BL^x)M = P^x$$

$$(4) V = PA^x + L^x$$

$$\text{Where } X^x = \begin{bmatrix} 11 \\ 7 \end{bmatrix} \quad A^x = \begin{bmatrix} .6/11 & .4/11 & 2/6 \\ .6/11 & .4/7 \end{bmatrix} \quad L^x = [8/11 \ 8/7 \ 8/6]$$

$$BL^x = \begin{pmatrix} 2.5/11 & 2.5/7 & 2.5/6 \\ .5/11 & .5/7 & .5/6 \end{pmatrix} \quad P^x = [1 \ 1 \ 3]$$

$$M = \begin{pmatrix} 1+r_1 & 0 & 0 \\ 0 & 1+r_2 & 0 \\ 0 & 0 & 1+r_3 \end{pmatrix}$$

This first two equations in this system describe the two production processes in industry A – A1 and A2 – and the third the single producers in industry B. Since output in A is unchanged the values and prices of production of A and B remain unchanged. What remains to be determined are the rates of profit and individual values for the two producers in A. Since both A1 and A2 are subject to  $P_1$ , the expanded vector of production prices is  $P^x = [1 \ 1 \ 3]$ . Given  $P$  and  $P^x$ , equation (3) can be solved for the rates of profit for the two producers in industry A. Producer 1 receives a rate of profit of 72% while producer 2 receives 25%. Equation 3 can then be used to solve for the individual values of the two producers -- .945 and 1.37 hours respectively.

Table 3, below, shows the expanded model with the profit rate information given in columns 7 and 8. In industry A, the output of the less efficient producer has an individual value of 1.37 hours, well above the price of production of 1 hour. Because A2 uses more labor-time than is socially necessary, this producer forfeits just over 1/3 hour per unit produced losing 2 and 2/3 hours in total (Column 6). The more efficient producer is able to produce at an individual value of .945 hours. As a result A1 gains .055 hours per unit or 2/3 of an hour in total. As before, 2 hours are lost to industry B but this burden falls entirely on the less efficient producer. Competition between producers within an industry thus results in a reduction in the individual value of the more efficient producer who thus enjoys a higher than average rate of profit and is able to capture some of the value generated by the less efficient producer.

### Insert Table #3

An advantage of this expanded model is that it allows, for the first time, an analysis of the effect of a change in demand on the determination of the value and exchange value in the context of competition both within and across industries. Previous attempts to theorize demand have gone one of two ways. The traditional interpretations of value tend to focus exclusively on competition within an industry in order to theorize the determination of the market-value. Since shifts in demand result in a transfer of value from one industry to another, the full effect of demand cannot be analyzed at the level of analysis which considers only a single industry.<sup>11</sup> In fact, by focussing at the industry level and ignoring the inter-industry transfer of value, the illusion is created that shifts in demand alter the magnitude of value. For this reason most theorists have rejected the idea that demand directly affects value. Alternatively, theorists in the monetary approach have tended to ignore the intra-industry aspect of competition and focussed instead on the competition across industries. Shifts in demand redistribute value but value is no longer defined with reference to the conditions of production in each industry. The next step, then, is to show how a shift in demand affects the determination of value and exchange value when both these dimensions of competition are considered. In doing so the value category market price of production is introduced as the relevant form of exchange value for theorizing the effect of demand.

### C. Market Prices of Production

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<sup>11</sup> Horverak (1988) provides an account of the demand which utilizes Rosdolski's interpretation of the effect of demand on market-value but which restricts the analysis to a single industry. As a result he is unable to break out of the determination of value with reference primarily to the conditions of supply. Indart (1990) recognizes that the interpretation applies to prices of production but ascribes the effect of demand only to cases involving rent.

When considering competition within a single industry, Marx uses the concept of the market-value to describe the exchange-value of a commodity. With the introduction of inter-industry competition, the price of production replaces the market-value as the relevant magnitude describing a commodity's exchange value. By its definition however, the price of production is limited to analyzing the relationship between producers under the assumption that supply and demand are equal in all industries when commodities exchange at these ratios. In Volume III, Marx discusses how a change in demand affects the determination of the exchange value of a commodity. Since only a single industry is considered, he uses the market-value to illustrate the effect of demand but he makes clear that the same reasoning applies to the determination of the price of production once the appropriate changes are made.<sup>12</sup> Most theorists have either ignored these passages or have encountered difficulties in reconciling their content to the interpretation of the role of demand.<sup>13</sup>

The present interpretation builds upon Rosdolski's reading of Marx's analysis of the integration of demand and does not encounter these inconsistencies (1977: 73-95). Rosdolski argues that the introduction of excess or deficient demand brings into play a second sense in which labor can be considered socially necessary. In spite of being expended in accordance with average skill and intensity, labor may fail to be socially necessary if it is not expended in proportion to the existing social need.<sup>14</sup> By introducing excess and deficient demand into the analysis, this second aspect of the social necessity of the labor expended is called into question for the first time. Marx addresses this point in the following passage:

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<sup>12</sup> "What has been said here of market-value applies to the price of production as soon as it takes the place of market-value" (Marx, 1959: 179).

<sup>13</sup> Itoh (1988) for example argues that the various methods of determining the magnitude of the market value offered by Marx are logically inconsistent.

<sup>14</sup> This argument appears first in the English language in the work of I.I. Rubin (1973). It is defended by a number of theorists who adopt a monetary approach to the determination of value.

...(S)uppose that every piece of linen in the market contains no more labor-time than is socially necessary. In spite of this, all these pieces taken as a whole, may have had superfluous labor-time spent upon them. If the market cannot stomach the whole quantity at the normal price of 2 shillings a yard, this proves that too great a portion of the total labor of the community has been expended in the form of weaving. *The effect is the same as if each individual weaver had expended more labor-time upon his particular product than is socially necessary.*

(1954: 109, emphasis added)

In Volume III, he adds:

...in general too much social labor has been expended in this particular line; in other words, a portion of this product is useless. It is therefore sold solely as if it had been produced in the necessary proportion. This quantitative limit to the quota of social labor-time available for the various 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.*

(1959: 636, emphasis added)

In the presence of excess or deficient demand, it is no longer sufficient to determine the quantity of socially necessary abstract labor-time according to the average quantity of labor expended since this labor cannot be considered to be expended in the socially necessary quantity. In these circumstances, how then is value to be determined?

In an important passage Marx suggests that the exchange value is no longer a magnitude fixed entirely by the average conditions of production. Rather, the conditions of production define a range within which the magnitude of the exchange value can vary depending upon the strength of effective demand. Demand determines from within this range what quantity of the labor expended in production is socially necessary and therefore constitutes value. Under conditions of excess demand the socially necessary abstract labor-time the commodity represents rises. This rise in value reflects the fact that while a given proportion of the total social labor was devoted to the production of the commodity, a greater proportion is deemed socially necessary according to effective demand.

Should (the) quantity (produced) be smaller or greater, however, than the demand...there will be deviations of the market-price from the market-value. And the first deviation is that if the supply is too small, the *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 circumstances; and 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 considerable above or below the market value.*

(1959: 185, emphasis added)

According to the traditional interpretation, the market-value is a fixed magnitude unaffected by demand; according to the monetary interpretation the market-value varies directly with the market-price and no deviation is therefore possible. What this passage suggests is something different: the market-value varies with the market-price within the range determined by the conditions of production and only in the case of extreme variations of demand is there a deviation between the two. What light does this interpretation shed on the disagreement between the traditional and monetary interpretations?

In response to the traditional interpretation it can be seen that the present interpretation does not necessarily imply that demand alters the magnitude of value. In the context of a single industry the a shift in demand does alter the magnitude of a commodity's value. However, when competition among industries is considered, it can be seen that a demand shift merely redistributes value among the industries; the overall magnitude of value need not be affected.<sup>15</sup> Furthermore, since the conditions of supply place a limit on the extent to which the value of any one commodity can rise or fall as the result of a shift in demand, the conditions of production retain their role in defining the range within which a commodity's value can move. All of the

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<sup>15</sup> Changes in demand which involve excess or deficient *aggregate* demand may involve changes in the magnitude of value in the period. Such an analysis requires an analysis of changes in demand affect the value of money which lie beyond the scope of the present analysis.

factors affecting the quantity of labor-time expended in production, as well as the turnover time of productive capital continue to be important to the determination of commodity values.

Finally, the importance of the monetary nature of exchange, stressed by those who favor the monetary approach, is incorporated. The quantity of value produced in an industry cannot be known until the labor of independent producers is integrated into a social division of labor through the process of exchange. This insight of the monetary approach is thus retained without abandoning the importance of the conditions of production in determining a commodity's value. In this way the conditions of production and demand act together to define the socially necessary labor-time each commodity represents in exchange.

This interpretation resolves a long-standing debate in the literature concerning the reconciliation of the two apparent meanings of socially necessary labor. As well, it provides an integration of demand which respects the importance of both the conditions of supply and demand in the determination of value and exchange value. However, since the argument is made at the level of analysis of a single industry where the exchange value is defined by the market value, its relevance to the integration of demand has been largely ignored. What remains is to apply the reasoning at the level of analysis of inter-industry competition where the price of production is the relevant measure of a commodity's exchange-value.

The question can be framed in the following way. Suppose at the price of production of 1 hour there exists excess demand for A. The quantity of total labor expended on A is therefore less than that which is socially necessary given the effective demand. What quantity of *socially necessary* abstract labor-time defines the exchange value of A? According to the above reasoning the exchange of 1 unit of A for 3 units of B no longer represents an equivalent exchange of value since the socially necessary abstract labor represented by one unit of A now

exceeds the amount expressed by the price of production. The exchange value must therefore rise above the price of production to reflect the existence of the excess demand for A. Here it is argued that the market price of production is the value category which defines the magnitude of socially necessary abstract labor-time that the commodity represents in equivalent exchange when the existence of excess and deficient demand is incorporated into the analysis. It is the exchange value once the assumption of sufficient demand is dropped.

There appear to be two possible sources for this excess demand and it is important to distinguish between them in order to theorize the determination of the market price of production. The demand could, in the first case, shift from one industry to the other leaving the total demand in the period constant. In the second case there would have to exist some way of financing a total demand which exceeded the income produced in the period. The financing could come from either the creation of credit or the use of savings. In either case, the use of money as a store of value would need to be introduced. As a first step towards a more comprehensive theory of changes in demand, only a shift in demand will be considered. This implies that the total demand in the period is held constant.

In order to determine the magnitude of the market price of production, it will first be necessary to define the range within which the market price of production can move with the variation in demand. In the case of a single industry, this range is given by the individual value of the least and most efficient technique of production. In the case of competing industries, it is defined as the technique which would give the extreme techniques a rate of profit equal to the general rate of profit. The magnitude of the market price of production can be defined as the ratio of the total demand in the period to the units of output produced, provided that this

magnitude lies within the range determined by the extreme techniques of production.

Algebraically,

$$(5) \quad P^m = DX^{-1}$$

subject to

$$r_{A1} \leq r_g \leq r_{A2}$$

$$P^m X = PX$$

Where:  $P^m$  is the vector of market prices of production  
 $D$  is the vector of total demand in units of value.  
 $r_{Ai}$  is the rate of profit for the  $i$ th producer in industry A.

To find the upper limit of the range within which the market price of production can move, the profit rate for the A2 is set equal to the general rate of profit. Given the total demand constraint, solving for  $P^m$  gives the prices for A and B which will give the least efficient producer in A a rate of profit equal to the industry-wide average.<sup>16</sup> At the stage of the analysis which incorporates inter-industry competition, this magnitude is the equivalent of the individual value of the least efficient technique. Similarly, setting the rate of profit for A1 equal to the general rate of profit reveals the lower limit to the market price of production. The two limits in the present example are 1.25 hours and .86 hours respectively. Given the structure of production, the quantity of labor-time considered socially necessary can vary between .86 hours and 1.25 hours. The actual demand is necessary to determine the magnitude of the market-price of production within this range. If the actual demand is 18 hours then labor has been expended in proportions which just satisfy the existing socially need; the exchange-value is defined by the price of production, one hour of socially necessary abstract labor-time. If however, demand lies above or below this socially necessary proportion, the market price of represents the quantity of socially necessary abstract labor-time for the commodity.

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<sup>16</sup> For simplicity the techniques of production in industry B are not specified. It is assumed therefore that the fluctuation in demand in B remains within the limits set by the extreme techniques in that industry. A more

If the ratio of total demand to the units produced is within this range, then the market price of production (expressed in money units) varies directly with the market-price, the average selling price in the period. This case would be considered to be a normal shift in demand. An extreme shift in demand occurs whenever excess demand persists when the market-price of production is equal to the individual value of one of the extreme techniques. In this example, if excess demand should exist when the market price of production rises to 1.25 hours, or if deficient demand should persist when the market price of production falls to .86 hours, then there will be a divergence between the market-price of production and the market price.<sup>17</sup>

In order to illustrate a normal shift in demand, what is required is the information concerning the total effective demand for the two commodities in the period. The total demand in money units multiplied by the value of money gives the total demand in hours. Here it is supposed that D, the total demand for A and B, is 22.5 hours and 13.5 hours respectively, leaving the overall demand constant at 36 hours. Given D, we can solve for the market price of production using equation 5 above to find  $P^m = [1.25 \text{ and } 2.25]$ . Since 1.25 is within the range defined by the techniques of production in A we know that the relevant magnitudes of socially necessary abstract labor-time for the two commodities, given the distribution of effective demand in the period are 1.25 hours and 2.25 hours respectively.

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comprehensive model would include the extreme techniques in all industries but this is not necessary to the present analysis.

<sup>17</sup> Since the analysis of extreme shifts in demand again raise conceptual issues concerning changes in the value of money, the remaining analysis will focus on normal shifts in demand.

The difference between the exchange-value and the value shows how the process of exchange redistributes value among producers in the economy. It remains to be shown how the shift in demand affects the distribution of value in the period. In order to isolate the effect of demand it is assumed that there is no change in the distribution of physical quantities. We can therefore use the physical quantities in  $A^x$  and  $BL^x$  to convert determine the constant, variable and surplus value for each producer evaluated on the basis of the market-prices of production. This will show the socially necessary abstract labor contributed by the constant and variable capital and the surplus created by each producer (Columns 1-3). Column 4 shows the magnitude of total value produced by each producer. While the total value remains unchanged at 36 hours, the value of A has risen by one half hour and the value of B has fallen by one half hour as a result of the shift in demand. The shift in demand has affected the value expended in each industry by affected the quantity of labor expended that is socially necessary.

Insert Table #4

Dividing the total value produced in each industry in column 4 by the units produced gives the values of A and B, 1.14 hours and 2.58 hours respectively. Subtracting total value from total exchange value (Column 5) shows the redistribution of value in the period. There is now net inflow of 2 hours of value into industry equal to the difference between the value of 1.14 hours and the exchange value of 1.25 hours for each of the 18 units produced. The shift in demand, through its affect on the quantity of labor considered socially necessary, has reversed the flow of value that occurred under the assumption of just sufficient demand. Industry A now is credited with 2 hours more value than is expended in the industry. The shift in demand raises the average rate of profit in the industry to 88% leaving the least efficient producer with a rate of profit equal to the economy-wide average.

The market-price of production thus allows an analysis of the value and the exchange value of commodities under conditions of excess and deficient demand when the rates of profit across industries is not assumed to be equal. The relationship between value and exchange value at this stage of the analysis continues to show the redistribution of labor-time that occurs as the result of exchange. The conditions of production continue to affect the magnitude of value and exchange value by defining the total value available for distribution in the period, the general rate of profit and the limits to the variation in the market-prices of production due to shifts in demand.

#### D. Implications and Directions for Further Research

Since solving for a requires the imposition of the aggregate demand constrain, the assumption of sufficient aggregate demand becomes central to the analysis. The next step which is necessary to provide a general account of market prices of production, is to define the latter without this restrictive assumption. What is necessary in order to do this is to account for quantities of value leaving or entering the period allowing for demand to deviate from total value produced. Since money as a store of value is one means by which value can be transferred intertemporally, the next step appears to be an integration of the above analysis with an analysis of the value of money. While such an integration lies beyond the scope of the present analysis, it is hoped that the conceptual issues clarified by the integration of demand into the determination of value will assist in clarifying the outstanding questions concerning the relationship between value and money. There are two avenues of inquiry to be explored. For a commodity money system a question arises concerning how a shift in demand affects the exchange value of gold and how money prices and the transfer of value between periods are affected by this shift. For a non-commodity money system where the value of money is defined

as a ratio between the total value and the total money prices in a period a similar question arises. How does the value of money change in response to a change in demand which may affect the total value and money prices differently. Once these questions are addressed, it will be possible to introduce further contingencies into the analysis. Capital stocks, inventories, unproductive labor and debt financing must be introduced in order to show the effect on price formation and the distribution of value. The category of market price of production, because it is able to define value and exchange value under conditions of excess and deficient demand in markets is a necessary step toward the fuller development of a Marxian theory of capitalist markets.

#### E. Conclusion

The struggle over the share of the total value produced, which takes the form of a struggle over effective demand, is in this approach set on par with competition over the techniques of production as an arena of struggle between capitalist producers. This approach to the determination of value and exchange value avoids the technological determinism of the traditional approach which privileges the conditions of production. All of the economic, cultural, political and natural processes associated with this struggle are seen as important determinants of the distribution of value in the economy. On the other hand, because the role of the conditions of production determining a commodity's value and exchange value is retained, the analysis of the effects of changes in the conditions of production to the determination of value is retained. All of the factors affecting both demand and supply play a role in the competitive struggle between workers and capitalists and among capitalists themselves. Value theory does not get left behind, but becomes integral to the analysis of how capitalist economies handle the problem of how to distribute people's labor-time among different uses, how capitalist economies answer the question of what kinds of labor are socially necessary.

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Table 1: Physical Units

	Constant	Variable	Surplus	Total
A	[1:1]	[5:1]	[5:1]	[11:3]
B	[2:2]	[2.5:0.5]	[2.5:0.5]	[7:3]
A+B	[3:3]	[7.5:1.5]	[7.5:1.5]	[18:6]

Table 2: Prices of Production

	Constant	Variable	Surplus	Total Value	Total PP	Net Chg.
A	4	8	8	20	18	-2
B	8	4	4	16	18	2

A+B	12	12	12	36	36	0
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Table 3: Inter- and Intra-Industry Competition

	Constant	Variable	Surplus	Total Value	Total PP	Net Chg.	P-rate	Value
A1	2.4	4	4	10.4	11	0.67	72%	0.95
A2	1.6	4	4	9.6	7	-2.67	25%	1.37
B	8	4	4	16	18	2	50%	2.66

Table 4: Market Prices of Production

	Constant	Variable	Surplus	Total Value	Total MPP	Net Chg.	P-rate
A1	2.1	4.25	4.25	10.6	13.75	3.15	117%
A2	1.4	4.25	4.25	9.9	8.75	-1.15	55%
A	3.5	8.5	8.5	20.5	22.5	2	88%
B	7	4.25	4.25	15.5	13.5	-2	20%
A+B	10.5	12.75	12.75	36	36	0	55%