The quantitative determination of abstract labour and values

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Abstract

In this paper we show first of all how to calculate the magnitude of the vector of labour values without having recourse previously to the vector of direct (abstract or concrete) labour that is usually considered as a necessary condition for it. We show that, apart from its *total* volume, which is supposed here to be equal to the total volume of concrete labour, the magnitude of direct abstract labour per unit of commodity is not needed for the calculation of values, either as one of the ingredients of value (to be added to a second ingredient: the amount of indirect abstract labour embodied in the means of production) or as a "coefficient of labour" that becomes value once vertically integrated. We will show then, beginning from unit values, how to compute the vector of abstract labour, both per unit of output and as a fraction of total labour, and their respective "coefficients of reduction" by means of which they can be considered a multiple of the quantities of concrete labour. Both things are discussed at the theoretical level and also by means of a numerical example that helps to understand the implications of the new definitions. The main implication is that, though "physical" data suffice to determine the vector of "relative" values (or any of their infinite multiples), labour is not redundant for a theory of value because the latter requires the determination of "absolute" values as a unique vector, for which the magnitude of total labour expended is needed.

As a second aim of the paper, we intend to show that Rubin's ideas on both the qualitative and quantitative determination of abstract labour and the role of exchange, demand, and social need in the quantitative definition of values—ideas that have often been misunderstood—are a necessary presupposition of the modern, correct quantification of abstract labour and value.

1. The definition of values and abstract labour

In order to compute the magnitude of values, we move away here from the most usual method and take instead a procedure that, even though it has been used before—see Morishima and Seton (1961) and, in a modified and simplified form, Guerrero (2000)—, it seems to have been subsequently forgotten by the literature in this field. Our method obtains the vector of unit values as the positive left eigenvector associated to the maximal eigenvalue of an input-output matrix, B', defined below, that is supposed to fulfil all the requirements to be "productive". Let us use x for the vector of physical outputs, and the following notation for the following matrices of "coefficients" (i.e. matrices whose elements are expressed as a magnitude "per unit of output"):

A the well known matrix of *technical* coefficients;

D the matrix of coefficients of *depreciation of fixed capital*, which is often omitted in this literature since most models just contemplate the existence of circulating capital, not fixed capital;

A' the sum of the latter two: $A' = A + D$;

B the matrix of "coefficients" of *real wages*, where b_{ij} means the quantity of commodity i actually consumed (as their own means of subsistence) by workers of industry j (per unit of output j)[1];

[1] This matrix allows the basket of real wages in every sector to be composed differently, so that the value of the labour force is calculated as the value (w) of those baskets of commodities, $w'B$. This matrix is not

K the matrix of coefficients of *constant* capital (note that it is not just *fixed capital*, but the sum of fixed constant capital plus circulating constant capital);

C the sum of *A'* and *B*: $C = A' + B$, and finally

$B' = B\,(I - C)^{-1} = B\,(I - A - D - B)^{-1}$.

Then, if one conceives values, *w*, as the sum of the value of the means of production used in production, $w'A'$, plus the value of the necessary means of subsistence of workers, $w'B$, plus the surplus value created, $w'Bs$ (where *s* is the general rate of surplus value, or $s = w'(I-C)x(w'Bx)^{-1}$), we can write them as

$$w' = w'C + w'Bs \qquad (1),$$

whence the eigenequation (2) follows immediately:

$$s^{-1}w' = w'B' \qquad (2)^2.$$

Equation (2) shows the vector of these "values" as the eigenvector associated to the maximal eigenvalue of $B' = B(I-C)^{-1}$, for whose knowledge only "physical" production data (*x, A, D*) plus the real wage are needed. But the real problem is that these "values" defined as in (1) and (2) are not the real *absolute* values required by Marx's labour theory of value (LTV)—which have to have one single magnitude, i.e. they have to be "absolute"—but just a vector of *ratios* of value, or *relative* values. Morishima and Seton are not aware of this problem and say that what "we obtain" through these equations is "the complete list of output-values, fully determined but for a proportionality factor which depends on whether labour-time is measured in hours, days, or any other units"

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generally used in the literature since most authors prefer to calculate the value of the labour force by multiplying *R*, a scalar denoting the "relative wage" (in the sense of Ricardo and Marx), by the vector of labour inputs, *l* (see for instance, Duménil and Foley 2008, to whom $R = 1/(1+s)$ with *s* = the rate of surplus value; see also Shaikh, 1977).

[2] Morishima and Seton (1961) start from what they call "force of exploitation" = 1 + rate of exploitation = $1 + s$, and arrive at an equation (similar to our equation (2)) that, in our notation, would be equal to $(1+s)^{-1}w' = w'B''$ [where $B'' = B(I-A')^{-1}$ instead of our B', which is equal to $B(I-A'-B')^{-1}$]. This type of eigen-equations has most often been used for reckoning prices of production instead of values, at least since Seton's "average cost ratio" (1957), that "may therefore be described as a *latent root* of the 'augmented technology'" (i.e., the usual "technology" with "the inclusion of 'wage inputs'"), similar to our matrix *C*.

(1961, p. 207). Of course, *any* multiple of the vector obtained in (2) is also a *formal* solution to the problem, a problem whose content is in this manner left unresolved. As we have written elsewhere, "no theory of value can state that values and prices are fully determined unless it gives an answer to the question of the absolute magnitude of both variables: it is precisely here where one gets at the core of the theory of value" (Guerrero, 2011).

2. Absolute values and abstract labour

A conscious or unconscious way to elude or blur the problem is to pose it as if it were the purely *technical* problem of the "normalization" or scaling of the solutions of those equations. For those who want to put it in this way, it must be said that a true theory of value requires this scaling not to be chosen arbitrarily, but deduced as a unique vector from the essential tenets of that theory.

What the LTV affirms first of all is that labour, and *only labour*, creates new value; more exactly, it states that a *specific quantity* of abstract labour creates a specifically *determined quantity* of value added in the economy. Therefore, the magnitude of vector *w* has to be such that

$$L = w'(I-A')x \qquad (3),$$

where *L* is the *total* labour (concrete and abstract at the same time) performed in the economy.

Therefore, the true values, that will be called "*v*" here, cannot be *any* arbitrary multiple of *w*, but precisely the *only* multiple that is exactly determined by the LTV according to (3), i.e. the one that satisfies equation (4), that requires scaling *v* as follows:

$$v = w \cdot L[(w'(I-A')x]^{-1} \qquad (4).$$

Only once the magnitude of absolute values is so *determined* by equations (3) and (4)[3] can the theory of value be complete. It is now obvious that, if *relative* values *w* can correctly be said to depend *only* on "physical data" other than labour—even if in reality both labour and the technique go necessarily together and are mutually interdependent—*the magnitude of absolute values is instead entirely dependent on the absolute quantity of L* expended in one year. This means not only that the LTV is not redundant[4] but also that there is no way to compute values in any capitalist economy except starting from the mass of labour performed in it in a given lapse of time.

Once values, *v*, are known, we can compute the value of the labour force (per unit of output), *t*, as the value of the means of subsistence that enter in the consumption of that labour force:

$$t' = v'B \qquad (5).$$

Likely, we can identify *direct* abstract labour with the new value (or value added) created by the labour force by means of its labour in the process of production; and since the rate of surplus value that enters in every value is uniform in all sectors—exactly by the same definitional reasons why the rate of profit that enters in every price of production is uniform too—, we can write abstract labour as follows:

$$l_a' = v'B(1+s) \qquad (6).$$

Note that l_a is a vector that differs from the vector of *concrete* direct labour, *l*, so that we must first of all clarify the most usual definition of values: values as "vertically integrated labour coefficients"[5]. We have now two quantitatively different non-integrated labour coefficients, *l* and l_a. Then, it is obvious that the vector of values obtained by equation (7) has to be different from that obtained from equation (8):

Incorrect: $$v_1' = l(I-A)^{-1} \qquad (7)$$

[3] The magnitude of production prices is determined in the same way, as have been explained elsewhere (see Guerrero, 2011).
[4] Contrarily to what is stated, for instance, in Steedman (1977).
[5] Even if the concept of "vertically integrated labour coefficients" is due to Pasinetti (1973), the formula was used previously, as can be seen at least in von Weizsacker (1971), p. 7, and Wolfstetter (1973), p. 790.

Correct: $v' = v_2' = l_a(I-A)^{-1}$ (8)

Often, when other authors write these equations most of them leave unclear whether they are using (7) or (8), i.e. whether they are starting from coefficients of concrete or abstract labour. What we are defending in this paper is that equation (7) is *not* the equation of values: values have to be computed by equation (8), not only because its solution is the same as that of equation (4) but because it is the only one compatible with Marx's LTV. Duncan Foley has written that "in empirical applications of Marxian theory, for example in Sraffian studies using Leontief's input-output data, 'labor' is identified with measured labor time, unadjusted hours of employment" (2004). For instance, this is the case in Duménil and Foley (2008), who speak of "direct labour expended in its production", but this practice has not been always the case[6]. What we are doing in this paper is to show that Foley is wrong when he writes that "this practice is acceptable and even probably inescapable in applied work"; but he is right when he declares that "it distorts Marx's full account of the relation between money and abstract social labor" (Foley, 2004). Indeed, equation (7) distorts Marx's ideas but, as we are seeing, its use is not inescapable.

The numerical example of the next section will serve us to confirm that it is the result of equation (8), not that of (7), which coincides with the solution of equation (4). But we must also criticize the ill-foundedness of another position that differs from Foley's: the position according to which *both* equations are "unsuitable for the calculation of commodity values". These would be the reasons to reject equation (7):

> "To see why, suppose that ([as in equation (7)]…) the vector l represents the average number of concrete labour-hours necessary to transform the inputs into the output. Even under these generous assumptions, the vector l cannot be directly used to calculate the value produced because it measures concrete rather than abstract labour. Since these labours are qualitatively distinct, any operation across them is meaningless. By the same token, labour employed in distinct

[6] For instance Shaikh and his followers, like Ochoa (1984), Chilcote (1997), Guerrero (2000) or Tsoulfidis and Mariolis (2007). Shaikh (1977) uses a vector of labour coefficients that he defines as the "number of hours of abstract labor-time added to each unit of the daily product", and he defines L as "the value added by living labour" (appendix, p. 41). Both things are correct, even though our method to compute abstract labours differs from Shaikh's.

activities, whether or not vertically integrated, may produce distinct quantities of value per hour because of training and other differences." (Saad-Filho, 2004).

Saad-Filho gives two different reasons for rejecting the idea; the first of them is not a valid one because the fact that concrete labours are "qualitative distinct" does not mean that they cannot be quantified as definite quantities of "hours of labour by unit of output". These quantities can form a quantitatively precise vector, exactly like in the case of *different kinds* of fruit that are always measured in "tons" in spite of being all different between them. The correct units are not "tons of oranges" or "tons of apples", but just "tons". Likewise, the units are not "hours of taxi-driver labour" and "hours of teacher labour", but just "hours". The second reason is a valid one, but it is a reason to support, not to reject, the use of equation (8), precisely because "labour employed in distinct activities (…) may produce distinct quantities of value per hour", which requires the use of coefficients of reduction (or multiplication) of concrete labours into abstract labour.

Saad-Filho follows by indicating that there is a second possibility when the vertically integrated coefficients are obtained from abstract labour (as in equation (8)), but he rejects it too:

> "Suppose, instead, that l is a vector of abstract labour. Although this would avoid the problems outlined above it would still not allow the value vector to be calculated. For this assumption implies that, in order to calculate the abstract labour necessary to produce each commodity (λ), one needs to know how many hours of abstract labour are necessary to produce each commodity (l). Because it involves a tautology, the assumption that l is abstract labour does not allow the quantitative determination of value." (ibidem)

Like in the case of Foley, Saad seems unaware of the methods we have used in this section in order to calculate both values and abstract labour. These methods serve us to deny as well the idea that "there is no way to reduce observable concrete labour to social abstract labour in advance, outside of the market which actually effects the reduction" (Gerstein, 1976, p. 250). We will come back to this below, but let us show first a

numerical example to support our theses, and then discuss other questions related to the definition and quantitative determination of abstract labour and value.

3. A numerical example

Suppose an economy composed of just two industries and defined by the following four matrices of coefficients: technical coefficients (A), depreciation coefficients (D), subsistence coefficients (B) and capital stock coefficients (K), apart from the identity matrix I:

$$I=\begin{pmatrix}1 & 0\\ 0 & 1\end{pmatrix},\qquad A=\begin{pmatrix}0.09 & 0.12\\ 0.15 & 0.08\end{pmatrix},\qquad D=\begin{pmatrix}0.12 & 0.04\\ 0.09 & 0.21\end{pmatrix},\qquad B=\begin{pmatrix}0.17 & 0.12\\ 0 & 0.1\end{pmatrix},$$

$$K=\begin{pmatrix}0.2 & 0.34\\ 0.05 & 0.14\end{pmatrix}.$$

We suppose that the total of hours worked in the economy, L, are 160, distributed among both industries according to the vector of concrete labours $L_s' = (80 \quad 80)$, measured in hours. Then, if the outputs of each industry are given by vector $x' = (40 \quad 110)$, the vector of concrete direct labour *coefficients* is $l' = (2 \quad 0.727)$, with $l'x = 160$. On the other hand, as matrix $B' = B(I-C)^{-1}$ amounts in the example to $B'=\begin{pmatrix}0.426 & 0.392\\ 0.077 & 0.199\end{pmatrix}$ and as the rate of surplus value, s, is the reciprocal of the dominant eigenvalue of that matrix, we obtain $s = 1.922$. Then, the positive left eigenvector associated with s^{-1} gives the vector of (*relative*) "values": $w' = (0.633 \quad 0.774)$, that, once normalized by multiplying it by $L(w'(I-A')x)^{-1}$, gives us the true (*absolute*) values: $v' = (1.637 \quad 2.011)$.

Now, we can calculate the vector of the value of the labour force per unit of output in each sector that will be $t' = v'B = (0.278 \quad 0.397)$, whence abstract labour (per unit of output) amounts to $l_a = v'B(1+s) = (0.813 \quad 1.159)$. Finally, we check that $v' = l_a(I-A)^{-1}$ (equation 8) gives the same result that equation (4)—i.e. $(1.637 \quad 2.011)$—, which is not true of equation (7) that gives $(3.052 \quad 1.712)$.

Furthermore, when it is stated "that the only way to compare qualitatively distinct types of labour is through the value added per hour of labour in each branch" (Saad-Filho, 1997, p. 463), this is really a recognition of the fact that ratios l/l_a can be interpreted as "coefficients of reduction" of quantities of concrete labour into quantities of abstract labour, in a context where the total is invariant:

$$l_a'x = l'x = L = 160.$$

In our example, as l is = (2 0.727), we obtain a *ratio* l_a/l equal to (0.407 1.593), whereupon we deduce that in the first industry of our example one hour of concrete labour is equal to 0.407 hours, i.e. 24.4 minutes of abstract labour, whereas 1 hour of concrete labour in industry 2 equals almost 4 times more abstract labour than in sector 1, exactly 95.6 minutes. Having into account the equalities $l_a'x = l'x = L = 160$, the latter is evidence that translating quantities of concrete labour into quantities of abstract labour looks like a "redistribution" of total labour among industries, which makes entire sense if we start from the idea that *at the aggregate level* (but not at the industry level) the sum of hours of concrete labours *is the same* as the sum of hours of abstract labour[7].

The same result that can also be seen in terms of the *total* number of hours worked in every sector. If we "weight" the hours of total concrete labour, Ls = (80 80), by the ratio l_a/l, we get at vector L_{sa} = (32.533 127.467), that means that the same quantity of hours (80) of different concrete labours expended in each sector amount to a very different magnitude of abstract labour; in fact, they are equal to 32.5 hours and 127.5 hours of direct abstract labour respectively.

Finally, an alternative but completely equivalent way to arrive at the vector of abstract labour is to multiply the quantities of concrete labour in each industry by the *relative* value of the labour force of that industry (i.e. the value of its particular labour force *as*

[7] Note that if we call y the net product, the usual equality $l'x = v'y$ is as valid as $l_a'x = v'y$; so, when it is just said something like "l is the labour directly required per unit of output, measured in hours of socially necessary labour-time" (Mohun, 1994, p. 402), it is not yet clear if we are speaking of either concrete or abstract labour. Likewise, saying that values are measured "in units of (unskilled) labor-time" (Ochoa, 1984) is not enough, because the dichotomy skilled/unskilled labour cannot be confused with the dichotomy abstract/concrete labour. As we have already said, many authors seem to think that they are using "physical labour input", probably meaning some amount of concrete labour (see Johansen, 1961, p. 221).

compared to the value of the average labour force of the economy). Note that it is *not* actual market wages what we are using in this calculation[8], but so to say "wages" measured in pure labour-value terms. Let us see. As B is the matrix of coefficients of *real* wage, $t' = v'B$ would be the vector of the *values of labour force* in every industry ("per unit of output"); t_{pc} the vector of values of the *unit* ("per capita") *labour force* in every industry (i.e. the ratio between *t and l*); and $t^* = t'x(l'x)^{-1}$ the scalar showing the value of the *average* unit labour force (per capita) for the overall economy. Therefore, the ratio between each element of t_{pc} and t^* gives us the vector, t_r, of "*relative* values of the labour force" in every industry. It is easy to see that in our example t_r = (0.407 1.593), which coincides with the ratio between abstract and concrete labour, l_a/l, calculated previously.

4. Production, exchange and abstract labour

The precedent discussion shows that most treatments of the quantitative aspect of abstract labour found in literature are seriously misconceived. Not only they fail, as we have seen, to solve the problem of the quantitative determination of abstract labour, but they show also an arguable conception of its qualitative features. Let us now turn to this qualitative side of the question of abstract labour, where many disputes are still alive, not in vain "the debate over the nature of abstract labour is at the heart of most of the controversies in Marxist economics" (Mohun, 1991, p. 2). One of the main disputes concerns money. Up to now, we have not mentioned the thorny question of money and our intention is not to deal directly with it in this paper. We agree in that money is the *necessary* form of expression of values in the real world, but it seems to us legitimate reflecting on the methods of approaching the "inner measure" of value.

What has been developed in previous section shows that for us, like for Marx, the value of every commodity "is determined not by the necessary labour-time that it itself

[8] This is what Shaikh (1984), Ochoa (1984), Chilcote (1997), Guerrero (2000) and others have done in their empirical work. Shaikh's quantitative definition of abstract labour amounts, in our notation, to making use of the price of labour force, $m'B$, not of its value, $v'B$ (being m the vector of market prices). As we have seen, the instinct for going beyond the magnitudes of concrete labour is correct but the need to use empirical (market) data for adjusting the quantities of concrete labour is felt only because no equation like our (8) is used (Shaikh, 1994).

contains, but by the *socially* necessary labour-time required for its reproduction" (Marx 1894, p. 238); which means that "value is measured not in units of embodied labour-time, but rather in units of 'socially necessary labour-time'" (Himmelweit and Mohun, 1981, p. 233). Of course, the difference between "required" and "contained" refers to the fact that labour used in production and counting as value has to be both "technically" and "socially" necessary labour time. The former means two things: 1) that labour in a firm is inevitably compared to the average of its sector, so that an individual labour—but note that the "individual" is here the firm, not the worker—that is not as efficient as the average cannot count in full as necessary labour time; 2) that if, at the sector level, there is a change in the average unit value of one or several means of production, the labour necessary for reproducing them is the one that *is* necessary *at present* for the reproduction of those means of production and not the labour that *was* necessary when those means were produced. And "socially necessary" means that the *entire* mass of commodities of type *i* actually produced has to have a *use value* for society—since, like in the individual case, use value is a presupposition of value also at the global level—so that if the mass produced exceeds the mass demanded at its market value, not all commodities can count as produced by *necessary* labour. We will deal with these problems in sections 6 and 7, but we must face others previously.

All participants in these debates would agree in that "Marx's 'value' is the product of abstract labour" (Himmelweit and Mohun 1981, p. 233), but questions related to the precise role of exchange and money in the definition of abstract money are more problematic. As a sample of the subtleties found in the debate, let us pay attention to the following sentences: "exchange creates value but production determines the magnitude of value" (De Vroey, 1981, p. 177); or "for Marx, commodities have value because they are produced for exchange in a society in which commodity relations have become generalized" (Himmelweit and Mohun, 1981, p. 225). Both are true from the point of view of this paper, but what can we say about the following?: "the value of a commodity has no expression except as exchange-value" (Himmelweit and Mohun, 1981, p. 234); or "the reduction of labour to abstract labour can be done only by the market" (Himmelweit and Mohun, 1981, p. 233)[9].

[9] We could show many other similar sentences. One can ask: Is it true that there is in Marx—and/or in who is one of his best disciples, Rubin—an ambiguity because he deals with abstract labour in a double, contradictory way, sometimes as "logically anterior to exchange" and other times as "logically posterior to

Our main assertion in this and the following sections is that Rubin has clarified all these problems. But it is worthy to pay attention first to some other authors who have contributed as well to its clarification. For instance, John Weeks has made a valuable effort to distinguish a third way between the traditional "embodied labor interpretation", that "implies that value in terms of labor time can be deduced directly from the observation of labor-in-production", and the "'validation' school of interpretation of the law of value", that "can produce no underlying determinant of market values at all" (1990, pp. 4-5). Weeks rejects the latter because the consequence of its approach "is to be left with no value theory at all"; he thinks that, since for it "price *is* value", the consequence is that "price is indeterminate, set by conditions of demand", from which just "two routes are open (…): either they can discard the law of value as a dead end (the choice of De Vroey), or they can turn to general equilibrium theory as the Uno school has done." (1990, p. 11). On the other hand, Weeks rejects as well the "naturalism" of the "embodied-labour" interpretation, typical of both neoclassicals and Ricardians, because it amounts to consider "production as purely a technical question, determined outside of the system" (1990, p. 5); moreover, "this treatment of value, in addition to making the arbitrary assumption of homogeneous labor, falls victim to the Sraffian 'redundancy' criticism: if exchange values can be deduced directly from production coefficients, then deriving values in labor units is an unnecessary diversion (see Bandyopadyay 1985)." (1990, p. 5).

At the same time, Weeks tries to explain "how heterogeneous labor-in-production (concrete labor) is expressed as homogeneous labor-in-exchange (abstract labor)" in a way that differs from that of the validation school (1990, p. 5). For him, since the latter school "treats the metamorphosis of concrete to abstract labor as occurring in exchange", its idea that "private labor [has] to be 'validated' in exchange" would prevent us to say, with Marx, that commodities "enter the market with their values stamped upon them"; rather, according to that interpretation "it is the market that stamps them as values" (1990, p. 6). By contrast, Weeks "places the process of abstraction (particular to general labor) in

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exchange" (De Vroey, 1981, p. 184)? Is it true that "there can thus be no *a priori determination* of abstract labour for not until commodities are *actually exchanged* on the market can the products of individual producers satisfy the needs of others"? (Himmelweit and Mohun, 1981, p. 233; emphasis added). Is it true that "abstract labour is not an input into production at all"? (Glick and Ehrbar, 1986-87, p.472).

production" because "the real or essential process of abstraction occurs in production itself". (1990, p. 6)[10]

Like for Rubin, as we will see later, also for Weeks value "has an ex ante existence with regard to exchange", but he thinks so for wrong reasons: because "capitalist production involves collective, cooperative labor, *directly* social, consciously directed and controlled", and this "labor-in-production itself is social labor" (1990, p. 8). According to this, the work of thousands of slaves in the building of pyramids in Egypt would have been creative of value too. As Weeks seems not to pay attention to the distinction made by Rubin between exchange "as a *particular phase*" of the process of reproduction, and exchange "as a *social form*", a "historical" form of this process of reproduction, he feels necessary to resort to the following argument: "it is certainly correct that value implies validation, but this does not in turn imply that value determination is subsequent to exchange" because "the labor which went to produce it has *already been validated by exchange*", i.e. "all of the ingredients of production (…) have entered the production process as commodities, as values" and "represent *validated labor*, *abstract labor*", so that "the sale of the product represents the attempt by the capitalist to *recapture* value, not *establish* value" (1990, pp. 10-11).

Anwar Shaikh, who is cited by Weeks as sharing the same argument, offers an understanding of exchange as a historical and social form when he writes that "the concrete labours are thus counted as social labour only when they are *valorized*, and the necessity of exchange value lies precisely in the fact that it is through this device that a society containing apparently independent private producers comes to grips with the social content of their individual labours" (Shaikh, 1987, p. 9). Rubin also thought that "for an accurate interpretation of the opposition between concrete and abstract labor, one must start with the opposition which Marx drew between private and social labor" (1928, p. 141), and this is the reason why he asks not to confuse the dichotomy concrete-abstract labour with the dichotomy between "simple and qualified labor" (1928, p. 131).

[10] However, he disagrees with both the view that "the essence of abstractness is the real homogeneity of labor created by the development of capitalism" (see also, in the same sense, Desai 1974, p. 31), and the believing that, since "workers are deskilled" as a result of a historical process, "labor is rendered homogeneous in *production*, and this homogeneity is expressed (…) in exchange" (Weeks, 1990, p. 6). He points out that, even if the latter is true, "the deskilling argument implies that concrete labor is rendered homogeneous over time, and in and of itself has nothing to say about *abstract* labor" (1990, p. 7).

Let us turn now to Rubin.

5. Rubin and abstract labour

Rubin is supposed to be at the origin of a current of interpretation of Marx's theory of value called the "value-form" school or the "circulationist" school. In our view, a good deal of both the followers and the critics of the "value-form school" present a biased version of Rubin's position (see Mavroudeas, 2004, p. 189), included those who in a more nuanced way detect also in his book elements of the opposite, production-based view. This is the case of Kicillof and Starosta, who, apart from making a good review of recent debates, write that Rubin's book contains "two different approaches to value theory", i.e. a "circulationist perspective" and also a more "production-centred" point of view, concluding that "*both* readings of the *Essays* are possible" (2007, pp. 9-10).

In contrast with this, we think that Rubin is clear in that "abstract labour and value are created or 'come about,' 'become' in the process of direct production (Marx used the expression 'werden' more frequently for this process) and are only realised in the process of exchange" (Rubin, 1927, p. 126). And he maintains that "all (…) possibilities for the exchange of a specific commodity with another are governed by a determined regularity which is based in the process of production." (1927, p. 130)[11]

Rubin rejects indeed the "physiological", "physical" or "naturalistic conception of abstract labor" (1928, pp. 132-133)—he writes for example: "The relations between abstract labor and value cannot be thought of as relations between physical causes and physical effects" (1928, p. 153)—in favour of what he calls a "sociological theory of abstract labor" (1928, p. 135), to which what accounts is a given social and historical form of the production process (that of the capitalism), and to which physiological

[11] For instance, he says: "The exchange of a quarter of wheat for any other commodity is an exchange which is governed by a known regularity (*Gesetzmässigkeit*), and the regularity of these acts of exchange is due to their dependence on the process of production. We have to reject the notion that the quarter of wheat can be exchanged for any random quantity of iron, coffee etc. We cannot agree with the assumption that the proportions of exchange are laid down each time in the act of exchange itself, and so have a completely accidental character." (1927, p. 130)

labour is only "the presupposition of abstract labor" (1928, p. 136), being the physiological equality of labour just "a necessary condition for the social equalization and distribution of labor in general" (1928, p. 137).

Of course, he was aware of the challenge that his ideas represented to a certain tradition of Marxian authors, but he believed that his critics did not represent adequately his own position. The following is the way in which the confrontation was posed:

> "Some critics say that our conception may lead to the conclusion that abstract labor originates only in the act of exchange, from which it follows that value also originates only in exchange. However, from Marx's point of view, value, and thus also abstract labor, must already exist in the process of production. This borders on a very serious and profound question of the relation between production and exchange. How should we resolve this problem? On one hand, value and abstract labor must already exist in the process of exchange, yet on the other hand, Marx in several passages says that abstract labor presupposes the process of exchange." (1928, p. 147)

After discussing some textual evidence in both directions, Rubin concludes that, once the terms of the problem are correctly understood, it has an easy solution:

> "It is not hard to reconcile these views. The problem is that in treating the question of the relation between exchange and production two concepts of exchange are not adequately distinguished. We must distinguish exchange as a *social form* of the process of reproduction from exchange as a *particular phase* of this process of reproduction, alternating with the phase of direct production. (…) When Marx constantly repeats that abstract labor is only the result of exchange, this means that it is the result of a given social form of the production process." (1928, p. 149; emphasis added).

In consequence, "already in the very process of direct production, the producer appears as a *commodity producer,* his labor has the character of *abstract* labor, and his product has the character of *value*" (1928, p. 150), although it is true that a qualification is necessary: "in the process of direct production labor is not yet abstract labor in the

full sense of the word" because "it must still become *(werden)* abstract labor" in the real process of exchange (1928, p. 151).

In our view, Rubin's position on abstract labour has not been properly understood partly because of its extreme subtlety and partly due to the difficulties of a second problem related with it, the question of the relationship between "value and social need", which he studies in chapter 17 of his book and to which we will turn later. But let us add first something about his ideas on the "quantitative determination" of abstract labour.

Rubin thinks that "it is obvious that from the standpoint of Marx's theory, abstract labor has a determined magnitude, and precisely because of this the product of labor does not only acquire the social form of value but has a value of determined magnitude" (1928, pp. 151-152). Again, on this he rejects the interpretation that leads "to admit that the social equalization of labor in the process of exchange is carried out in isolation of dependence on quantitative aspects which characterize labor in the process of direct production (for example, the length, intensity, length of training for a given level of qualification, and so on)"; this interpretation is rejected because according to it "the social equalization would lack any regularity since it would be exclusively determined by market spontaneity" (1928, p. 154). By contrast,

> "We assert that in a commodity economy, the *social* equality of two labor expenditures or their equality in the form of *abstract* labor is established through the process of exchange. But this does not prevent us from ascertaining a series of quantitative properties which distinguish labor in terms of its material-technical and its physiological aspects, and which causally influence the quantitative determination of abstract labor before the act of exchange and independent of it. The most important of these properties are: 1) the *length of labor expenditure,* or the quantity of *working time;* 2) the *intensity* of labor; 3) the *qualification* of labor; and 4) the *quantity of products* produced in a unit of time" (1928, pp. 155-156), or "technical productivity" (1928, p. 158).

For Rubin, the first three seem to be related with the relation between different industries, but regarding the fourth of them he writes:

> "If we consider different expenditures of labor in the same branch of production (more precisely, expenditures for the production of goods of the same kind and quality), their equalization is subject to the following principle: two labor expenditures are recognized as equal if they create *equal quantities of a given product,* even though in fact these labor expenditures can be very different from each other in terms of length of labor-time, intensity, and so on. The working day of a worker who is more highly skilled, or who works with better means of production, is socially equalized with two days of labor of a less qualified worker, or a worker who works with poor means of production, even though the amount of physiological energy expended in the first case would be much smaller than in the second case. Here the decisive property which determines the quantitative characteristic of labor as abstract and socially-necessary does not in any sense represent an amount of expended physiological energy." (1928, pp. 157-158).

What the latter means is that the same quantity of concrete labour in a firm that is more efficient than the average of its sector is expressed in more value that the labour performed in the firms with average- and less tan average-productivity. But the same can be said of labours performed in different industries even though Rubin does not mention this case. The relative efficiency of labour in every firm, no matter to what sector it belongs, is entirely reflected in their different ratios between inputs and outputs, which express differences in the labour process. When the length or intensity of labour are greater than the average, when a relative great qualification of labour allows to use certain means of production that are not at the disposal of the workers in other cases, when machines used are better or more rapid because the technical composition of capital is higher, the ratio between some inputs (for instance, the energy consumed in the process or whatever else) and the output can improve as compared with firms or sectors where it is not possible to find the same conditions of labour. The so called "technical" coefficients[12] summarize all facts that take place in production, i.e. in the

[12] It is indeed true that there are certain "technical" facts and regular "proportions" in the field of production, but the input-output relations cannot be completely specified if *monetary* relations, i.e. relations that ultimately depend on *labour relations*, are not taken into account. The mere fact that free resources like the sun, the air, the wind, etc. do not appear in the rows of the input-output tables even though they do intervene as factors of production, or the fact that these coefficients change over time due

labour process, and determine, *together with the absolute amount of direct labour itself*, as we have seen, the magnitude of values, the value of the labour force and the quantities of abstract labour to which amount every magnitudes of concrete labour expended.

6. Rubin on demand and social need

Regarding the question of the influence of the magnitude of "social need" in the quantitative definition of value, Rubin *attacks* what he calls the "'economic' concept of socially-necessary labor", according to which "the value of commodities does not only depend on the productivity of labor" but also "on the volume of social needs or demand" (1928, p. 185). In order to present adequately his position, he begins recalling the operation of the supply and demand, first of all the fact that "the volume of *demand* for a given commodity changes *inversely* to the change in its *price*" (1928, p. 187), so that "in the capitalist society, social need in general, and also social need equipped with buying power, or the corresponding demand, do not represent (…) a fixed, precisely-determined magnitude" (1928, p. 187). On the other hand, "*demand*"—that in this context means 'quantity demanded'—"*is a quantity which is determined only for a given price of commodities*" (1928, p. 186). And since "the magnitude of a particular demand is determined by a given price", this means that "the *real volume of demand* is determined by the magnitude of the *productivity of labor,* which is expressed in the *value* (…)" (1928, pp. 187-188).

The next step is to remember that Marx calls "market value" the "equilibrium price" or "normal price" (1928, p. 189) that regulates *actual* prices, no matter—and it is extremely important not to lose sight of this in order not to be lost with the terminology—whether this regulating market value is the "labor-value" or the "production price". The important point is that "from an infinite quantity of possible combinations of the volume of demand and price, only *one* combination can exist

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to changes in the relative productivities of the labours producing two different inputs that can substitute each other because of a variation in their relative cheapness, should be sufficient to conclude that these coefficients are not simply "technical". The real fact is that these coefficients are indeed—and all the following expressions are equivalent here—capital-, money-, commodity-, or labour-dependent.

for *long,* namely that combination where the *market value* is equal to the price", that "represents the state of equilibrium, the average level, around which actual market prices and the actual volume of demand will fluctuate" (the latter being the "*equilibrium amount*") (1928, p. 189). Thus, for Rubin,

> "the *state of technology* determines the *value* of the product, and *value* in turn determines the *normal volume of demand* and the corresponding *normal quantity of supply,* if we suppose a given level of needs and a given level of income of the population" (1928, p. 190).

At its turn, "the deviation of actual from normal supply (i.e., overproduction or underproduction) brings about a deviation of market price from value", and "this price deviation in turn brings about a tendency to change the actual supply in the direction of normal supply" (1928, p. 190). As, over time, "*changes in value bring about changes in demand and supply*", so that "value (or normal price) determines normal demand and normal supply", we can "call the equilibrium stage between supply and demand the state in which commodities are sold according to their values[13]" (1928, p. 190). And "since the sale of commodities by their values[14] corresponds to the state of equilibrium between different branches of production, we are led to the following conclusion: *equilibrium between demand and supply* takes place if there is *equilibrium between the various branches of production*" (1928, p. 190).

Next, after explaining the asymmetry between supply and demand, in the sense that the latter has only a limited and subsidiary influence on equilibrium prices[15], Rubin

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[13] Or prices of production.
[14] Or, again, prices of production.
[15] "If changes in the demand for a given commodity influence the volume of its production, these changes in demand are in turn brought about by the following causes: 1) changes in the *value* of a given commodity, for example its cheapening as a result of the development of productive forces in a given productive branch; 2) changes in the *purchasing power* or the income of different social groups; this means that demand is determined by the income of the different social classes *(C., III, pp. 194-5)* and 'is essentially subject to the mutual relationship of the different classes and their respective economic position' *(Ibid., p. 181),* which, in turn, changes in relation to the change in productive forces; 3) finally, changes in the intensity or urgency of *needs* for a given commodity. At first glance it seems that in the last case we make production dependent on consumption. However, we must ask what causes changes in the urgency of needs for a given commodity (…) The increased need or demand brings about an expansion of production. However, this increase of demand was brought about by the development of productive forces, not in the given productive branch (…) but in other branches (…)." (1928, pp. 193-194)

makes precise the distinction between "quantity demanded" (a physical quantity) and "social need" (expressed in a certain amount of money):

> "the volume of demand equals the number of units of the product which are sought at the given price", whereas "*the multiplication of the value per unit of product (which is determined by the technical conditions of production) times the number of units which will be sold at the given value, expresses the social need which is able to pay for the given product*". (1928, pp. 195-196)

What Rubin wants to show is that the latter amount[16] "is not determined in advance by anyone in the capitalist society", but "only as a result of market competition, in a process which is constantly interrupted by deviations and breakdowns, a process in which 'chance and caprice have full play' *(C., I, p. 355)*" (1928, p. 196). By contrast, "advocates of the 'economic' interpretation of socially-necessary labor have placed the entire process on its head, taking (…) the entire mass of commodities of a given branch as the starting-point of their analysis", so that for them "this definitely fixed quantity determines the value of a particular unit of a commodity: this figure is equal to the *quotient* which results from dividing" that total "by the number of produced units". (1928, p. 197) In this way, they conclude wrongly that "the value of a unit of product can change (...) even if the production technique does not change", so that it would "not [be] determined by the amount of labor necessary for the *production of a unit of commodity,* but by the *total amount of labor allocated to the given sphere of production* divided by the *number of manufactured goods*." (1928, pp. 197-198)

For Rubin, it is the other way around: "*Value* is not determined by the quantity of labor in the *given sphere,* but rather that quantity *presupposes* value as a magnitude which depends on the production technique." (1928, p. 198). If this were not the case, we would be led to "the thesis of the inverse proportionality between changes in the quantity and the market price of products, namely the thesis of the empirical stability of the sum of market prices of the products of a given sphere"; but "Marx's statements in

[16] "This is what Marx called the 'quantitatively definite social needs' for a given product *(C., III, p. 635),* the 'amount of social want' *(Ibid., p. 185),* the 'given quantity of social want' *(Ibid., p. 188).* (…) This usual, normal volume of production is determined by 'whether the labor is therefore proportionately distributed among the different spheres in keeping with these social needs, which are quantitatively circumscribed' *(C., III, p. 635)*." (1928, p. 196).

this context must be understood, in our view, not in the sense of an exact *inverse proportionality,* but in the sense of an *inverse direction* between changes in the quantity and market price of products" (1928, p. 201). Rubin does not deny the existence of a "tendency to a proportional" (or "determined" or "stable") "distribution of labor between different spheres of production"; however, it "does not represent the starting-point of the economic process, but rather its final result" (1928, pp. 202-203). In fact, it should be understood as a composed factor, c, resulting from the multiplication of two prior and primary factors, a and b ($c = a \cdot b$), where a—i.e. "the *quantity of labor socially necessary* for the production of a unit of product (2 hours of labor), or the *value* of a unit of product (2 roubles)"—is "the *basic regulating magnitude* of the entire system of equilibrium of the capitalist economy" (1928, p. 205), and b is "the *normal volume of production*" (1928, p. 203).

7. A graphical representation of abstract labour

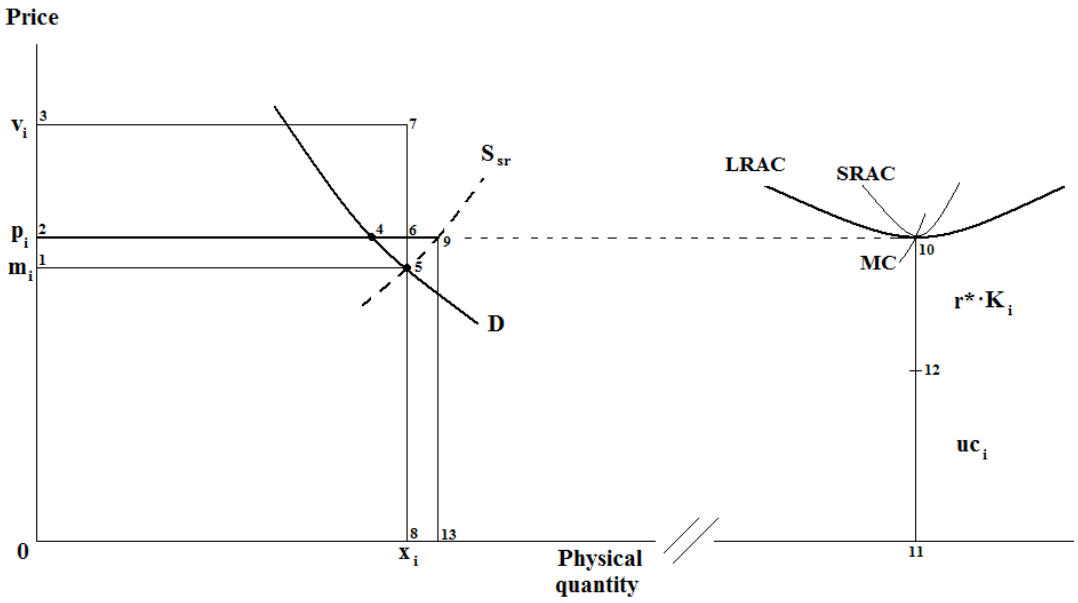
In our final section, we intend to show how Rubin's theses, that are in our opinion an extension of Marx's, can be represented graphically in a way that is perfectly compatible with the quantification of abstract labour that has been made in the first sections of this paper.

We can see in the right side of figure 1 that technical conditions and the productivity of labour in the "average" firm[17] of sector i make that the sum of its unit costs, uc_i, plus a mass of profits equal to the general rate of profit times its capital advanced, $r^* \cdot K_i$, amount to a unit production price equal to the distance between points *10* and *11*.[18] The fact that unit value, v_i, is in this case above production price, p_i, only means that i is a

[17] Neoclassical economics suppose that all firms in a sector are equal in the long run, and thus well represented by *the* "representative" firm. Here we avoid such an assumption, and we assume instead that there is always a "regulating" firm, among other firms that are different of it, that is characterized as having conditions of production equal to a "weighted" average of all firms, an average that will be in some cases close to the simple average and in other cases closer to either the best or the worst firms in the sector (from the efficiency point of view): see Marx, 1894, chapter 10.

[18] In neoclassical economics point *10* is called the "optimum of exploitation" of the "optimum scale", given by the minimum of the long-run average "cost" curve (LARC). As in this context "cost" includes a "normal interest", i. e. a mass of profits compatible with the general rate of profit, we see that the neoclassical economists are in fact referring to a price that coincides with the Marxian price of production.

sector with a value composition of capital inferior to the average of the economy; but all that will be developed in this section would also apply in the case that p_i were above v_i.



At production price *0-p_i* (see the left part of the figure), the physical quantity demanded is represented by segment *2-4*, whereas real production has been *2-9*, what means a surplus or overproduction equal to *4-9*. The horizontal line that passes through *2, 4, 6* and *9* is what can be called "long-run supply", and if we sum to it a short-run sloping supply as in the figure, we can see that *market price* will tend to be located below the production price, at level *0-m_i*, at which a mass of product of only *0-8* will be sold. Thus, actual sales are represented by the area delimited by rectangle *0-m_i-5-8*, i.e. the product of the unit market price by the physical quantity sold in the market, $m_i \cdot x_i$. If the curve of demand passed through point *9*, sales would be *0-2-9-13*, and in that case market price would coincide with production price at both unit and total levels, i.e. we would be before an *equilibrium* situation. If instead of this, the demand curve passes, like in the figure, by points *4* and *5*, the situation is of *disequilibrium*, but the unit price of production *does not change*, since it is determined by the same conditions of supply (costs and productivity) as before. What is changed is only the production price *of the mass of products*, since now is sold a quantity equal to *0-8*, instead of *0-13*.

Summarizing what has been said so far, we can state that: 1) if the conditions of the labour and production processes are given, unit value is always equal to *0-3* and unit production price always equal to *0-2*; and 2) if the curves of demand and short-run supply are those that appear in the figure, the magnitude of actual sales is *0-1-5-8*, the price of production (market value) of the quantity actually sold is *0-2-6-8*, and the labour-value (market value) of the quantity actually sold is *0-3-7-8*. Note that in the case represented in the figure we have $v_i > p_i > m_i$, but all other combinations are equally possible; however, at the aggregate level (all sectors together) we always have $v'x = p'x$, and in equilibrium also $v'x = p'x = m'x$ (where x is the vector of outputs, and v', p' and m' are the row vectors of values, production prices and market prices, respectively). Of course, in a theoretical context, as ours, where disequilibrium is possible, vector x cannot be the output produced but the output *sold*; many discussions do not even face the problem because they are placed in an equilibrium framework where both necessarily coincide.

Thus, coming back to the problem of the general relationship between abstract labour, values and social need, the conclusion is clear. (Unit) values and (unit) production prices are not affected nor determined by demand or the market: they are *previously determined in production*; that is why "value, and thus also abstract labor, must already exist in the process of production" (1928, p. 147). This is also the reason why Rubin wrote that "we cannot agree with the assumption that the proportions of exchange are laid down each time in the act of exchange itself, and so have a completely accidental character"; instead, "we maintain that all these possibilities for the exchange of a specific commodity with another, are governed by *a determined regularity which is based in the process of production*." (1927, p. 130; emphasis added).

However, it is also true that "social need" is also a determinant of the total market value created (*0-2-6-8*) and realized (*0-1-5-8*) as price: when there is equilibrium, it exists because production and demand coincide; when production is different from the quantity of demand determined by the level of the price of production, the physical quantity entering into calculation has to be different because not all products can be realized in the market at that price of production (or value), so that neither the mass of value nor the mass of price of production can be the same as in equilibrium. The subtlety and apparent ambiguity of these results explain the main problems of

interpretation of Rubin's conception of Marx's theory of value, and also the complexity of the debates between the form-of-value school and the traditional embodied-labour school.

Finally, we must conclude that even though one can speak of a quantity of labour expended in the production of the output actually sold—i.e. the output truly validated in the market as a definite volume of monetary equivalent, equal to the volume of actual social need (in our figure the rectangle *0-1-5-8*)—, total abstract labour (direct abstract labour plus indirect abstract labour) amounts to *a different quantity*. However, this quantity has a *double* determination, according to what level of analysis is being used. If we are speaking of market values proportional to labour-values, abstract labour (both direct and indirect) has to be computed as *0-3-7-8*; and if we are dealing with market values equal to production prices, abstract labour (both direct and indirect) has to be computed as *0-2-6-8*.

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