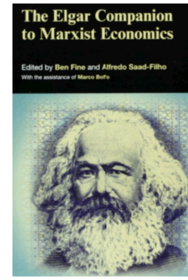

54. 'Transformation problem'

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The transformation of values into prices of production (TVPP) is one of several shifts in the form of value examined in *Capital*. These shifts are introduced sequentially, as Marx gradually reconstructs the processes of capitalist reproduction and accumulation across increasingly complex levels of analysis. Briefly, in *Capital I* Marx reviews the process of production of (surplus) value, including the determination of commodity values through the competition between capitals producing identical use values (intra-sectoral competition). *Capital II* examines the conditions of social and economic reproduction through the circulation of the (surplus) value produced across the economy. Finally, *Capital III* addresses two aspects of the distribution of (surplus) value. First is distribution across competing industrial capitals in different sectors, which concerns the possibility of capital migration and, consequently, the allocation of labour across the economy and the composition of the output. Second are the relationships between industrial, commercial and financial capital and the landowning class, showing how part of the surplus value is captured in exchange as commercial profit, interest and rent.

The Anglo-Saxon literature has tended to see these processes in isolation from one another (unrelated stages in the analysis and, correspondingly, separate theories of price, profit, interest and rent), with treatment of the TVPP focused narrowly on the quantitative relationship between vectors of equilibrium values and prices, and the corresponding redistribution of surplus value and profit. This analytical separation is incorrect, because these processes are integrally related to one another, and to the logic both of capital accumulation, and of Marx's *Capital*. Nevertheless, this separation is, largely, due to the fact that this literature perceives the TVPP, uniquely, to articulate the intangible domain of values with the visible realm of prices. Other contributory factors include the flirting engagement of mainstream economists, who saw in the TVPP an opening to attack the logical consistency of Marxism, and the wish of Sraffian economists to sideline their most significant rival amongst the heterodoxy (for a review, see Elson, 1979b; Fine, 1986). At another level, the TVPP has often provided the canvas for contrasting rival interpretations of Marx's theory of value (MTV), and the pretext for shunning it altogether.

THE 'PROBLEM'

Capital III opens with Marx's conceptual distinction between surplus value and profit. This is followed by the examination of the impact on the rate of profit of changes in turnover time, the rate of surplus value, and in the quantity, quality and value of inputs. In chapter 8, Marx points out that these factors, which govern changes in the general profit rate abstracting from competition, may also explain differences amongst profit rates of capitals competing across distinct sectors of the economy. This observation introduces the concept of inter-sectoral competition, marking a shift in the level of analysis. However, instead of immediately exploring this development, Marx turns to the differences between the technical, organic and value compositions of capital (TCC, OCC and VCC). He addresses the TVPP only in the following chapter.

In chapter 9, Marx contrasts five capitals equal to 100 but with different proportions of c and v, illustrating that capitals produce distinct use values with varying combinations of living labour, raw materials and machinery. Marx points out that these capitals will produce different amounts of surplus value because of their distinct OCCs, defined as c/v. For example, using only two sectors instead of Marx's five, one unit of capital invested in the steel industry typically employs less workers – and, therefore, directly produces less surplus value – than one unit of capital in the textile industry. Using Marx's notation, these capitals might be represented as, say, $80c + 20v$ and $20c + 80v$. Supposing the rate of surplus value is 100 per cent ($s/v = 1$), the output values will be $80c + 20v + 20s = 120$ in the steel industry, and $20c + 80v + 80s = 180$ in the textile industry. Therefore, their profit rates, $r = s/(c + v)$ are, respectively, 20 per cent and 80 per cent.

Classical Political Economy recognized that this difference is incompatible with inter-sectoral competition, which creates a tendency towards the equalization of profit rates. For Ricardo, a more sophisticated analysis was required, which he unsuccessfully endeavoured to provide (and for which Sraffa is presumed to have found a solution albeit at the expense of MTV; see Milonakis and Fine, 2009). In contrast, for Marx, while the abstraction that commodities exchange at their values permits the explanation of the production of (surplus) value, this level of analysis is insufficiently developed to account for inter-sectoral competition and, therefore, the composition of output and the distribution of labour. Their explanation requires a more complex form of value, which Marx called prices of production.

This shift, or transformation, in the form of value does not simply 'erase and replace' the previous abstraction (commodity values determined by socially necessary labour time) as if it were wrong or merely a special case (of equal OCCs). Nor is Marx confronting a purely logical (neoclassical) problem of finding a price vector that satisfies arbitrary static equilibrium conditions. Finally, Marx was fully aware that the input values had not been transformed in his presentation in *Capital*. Rather, in Marx's presentation the abstract content of value is being reproduced in a more complex and concrete form as prices of production, preserving the prior analysis and addressing additional (more concrete) aspects of capitalism on this basis. Unfortunately, Marx's presentation of the transformation is hampered by the unfinished status of *Capital III*. This has contributed to overlapping disagreements about what Marx really said, what he would have said if he had been able to finish this volume, and what he should have said in order to be 'right' according to differing interpretations.

In *Capital III*, Marx calculates the average of the profit rates of the five capitals in his example, and derives the prices of production of the output as $p_i = (c_i + v_i)(1 + r)$, where i represents the capital ($i = 1, \ldots, 5$) and the average profit rate is $r = S/(C + V)$, where S, C and V are the total surplus value and constant and variable capital. Therefore, while commodity values include the surplus value produced by each capital, the prices of production distribute the surplus value produced to equalize the profit rates across different sectors. In the numerical example provided above, the values of the output are 120 and 180, the average profit rate is 50 per cent (r = 100/200), and the prices of production of the output are 150 and 150.

The distribution of surplus value to equalize profit rates amongst competing capitals gives rise to 'profit' as a form of surplus value: this conceptual difference mirrors the difference between the 'production' of surplus value, and its 'appropriation' as industrial profit (at this level of analysis, other forms of profit, as well as interest and rent, are not present yet). Marx claims that the sum of prices is equal to the sum of values (in our case, 120 + 180 = 150 + 150), and that the sum of surplus values is equal to the sum of profits (20 + 80 = 50 + 50). These aggregate equalities illustrate Marx's claims that prices of production are transformed values, and that profit is transformed surplus value. In other words, each capitalist shares in the surplus value produced according to their share in capital advanced, as if receiving a dividend on an equity share in the economy's social or total capital as a whole.

Marx's transformation procedure has been criticized primarily because of a supposed logical inconsistency: he calculates the price of production of the output (steel and textiles) on the basis of 'untransformed' values of the inputs – whereas capitalists will have bought their inputs (including steel and textiles) at prices of production, not values. However, these commodities cannot be purchased as inputs at one set of prices (120 and 180) and sold at 'different' prices (150 and 150) as outputs, because every sale is also a purchase for one or other capitalist. Further, this implies that the 'value rate of profit', as calculated by Marx as $S/(C+V)$, is also not the monetary rate of profit at all since both numerator and denominator need to be recalculated at their prices of production as opposed to their values. In other words, Marx gets the rate of profit wrong and, even if he did not, he still gets prices wrong!

ALTERNATIVE INTERPRETATIONS

The charge of inconsistency was issued soon after the publication of *Capital III*, and it was brought into prominence in the Anglo-Saxon literature by Paul Sweezy (1942). The subsequent debate has focused on the algebraic difficulties of transferring monetary quantities across sectors in an economy in static equilibrium, starting from direct (untransformed) prices, a single value of labour power and equal rates of exploitation, and arriving at an identical material equilibrium with a single wage rate and an equalized profit rate, while, at the same time, validating Marx's aggregate equalities between total price and total value, and total surplus value and total profit. These controversies became especially prominent with the emergence of radical political economy in the late 1960s, and even attracted the attention of leading mainstream economists, especially Paul Samuelson, Michio Morishima and William Baumol. Alternative solutions to the 'transformation problem' proliferated, depending on the structure of value theory envisaged by competing authors and their choice of starting conditions, constraints and desired outcomes including, almost invariably, which aggregate equality should be sacrificed in order to 'preserve' the other. These transformation procedures were deemed to be significant because they would either 'validate' or 'deny' selected aspects of Marx's theory of value – or, even, the entire logical core of Marx's theory.

(A) NEOCLASSICAL AND SRAFFIAN

The neoclassical and Sraffian critiques of Marx are essentially identical if differently motivated and rooted. They postulate two equilibrium exchange value systems, one in values (defined as quantities of embodied labour) and the other in equilibrium prices. The value system is described by $\lambda = \lambda A + l = l(I - A)^{-1}$, where λ is the $(1 \times n)$ vector of commodity values, A is the $(n \times n)$ technical matrix and l is the $(1 \times n)$ vector of direct labour. Given the same technical matrix, the price system is described by $p = (pA + wl)(1 + r)$, where p is the $(1 \times n)$ price vector, w is the wage rate and r is the profit rate.

These systems provide the basis for a critique of both alleged inconsistencies and incompleteness in Marx, leading to the conclusion that the attempt to determine values from embodied labour, and prices from values, is logically flawed. In brief, while the value system can usually be solved, the price system has two degrees of freedom (it has n equations, but $n + 2$ unknowns: the n prices, w and r). A solution would require additional restrictions, for example, defining the value of labour power as the value of a fixed bundle, b, of workers' consumption goods (with wages given by $w = pb$), plus one of Marx's aggregate equalities – however, the other aggregate equality would normally not hold, which is allegedly destructive for Marx's analysis. Furthermore, this representation of Marx can scarcely distinguish between the role of labour and other inputs, in which case it cannot be argued that labour creates value and is exploited, rather than any other input, such as corn, iron or energy.

This critique of Marx is insufficient for four reasons. First, it presumes that the production structure is determined exogenously and purely technically while, for Marx, technologies and social forms are mutually constituting (capital accumulation and the development of productive forces do not rest on equilibrium foundations regardless of growth). Second, it assumes that, for values to have conceptual legitimacy, they should be necessary and sufficient for the calculation of the profit rate and the price vector. Since this is not the case in this model (in which, incidentally, the 'value' rate of profit has no significance for economic behaviour), value analysis is allegedly redundant. However, this claim is based on a misrepresentation of Marx's theory, where labour values, direct prices, prices of production and market prices are forms of value belonging to distinct levels of complexity, rather than sequences in deductive calculation. Third, the neoclassical and Sraffian value equation is inconsistent: if l represents concrete labour time, these labours are qualitatively distinct and cannot be aggregated; but if l is a vector of abstract labour values cannot be calculated in practice because abstract labour data are not directly available. Fourth, in this system the social aspect of production is either assumed away or projected upon the sphere of distribution, through the inability of the workers to purchase the entire output with their wages (see Rowthorn, 1980).

(B) VALUE-FORM THEORIES

Value-form interpretations of Marx draw upon the social division of labour and the production of commodities by 'separate' (independent) producers. Separation brings the need to produce a socially useful commodity, one that can be sold. Consequently, for this tradition, commodities are produced by private labours that are only potentially abstract and social: the conversion to value form only happens when the product is exchanged for money.

Value-form approaches have helped to shift the focus of Marxian studies away from the algebraic calculation of values and prices and towards the analysis of the social relations of production and their forms of appearance. Nevertheless, the claim that 'separation' is the essential feature of commodity production subsumes capitalist relations under simple commodity relations of production. This limitation helps to explain this tradition's stunted contribution to the theory of 'capital(ism)' – including the TVPP, which is frequently bypassed through the direct assimilation of values with market prices.

The 'new interpretation' (NI) of Marx's value theory was developed in the early 1980s, drawing heavily upon value-form analysis (Fine, et al., 2004). It eschews equilibrium analysis, and postulates that money is the immediate and exclusive expression (as well as the measure) of abstract labour. Since this interpretation remains at the aggregate level, it bypasses the relationship between individual prices and values that was normally associated with the TVPP. The NI defines the value of money as the quantity of labour represented by the monetary unit or, conversely, the abstract labour time that adds £1 to the value of the output. The newly produced money value is allocated as price across the net product. Further, the NI defines the value of labour power as the *ex post* wage share of national income (that is, the wage rate times the value of money), while the surplus value is the residual which confirms that profit is merely redistributed surplus value.

The NI has contributed to closer attention to Marx's value analysis, as opposed to imposing equilibrium interpretations of price theory, and it established a channel for empirical and policy studies. Nevertheless, the NI is limited at three levels. First, its focus on the net product short-circuits the production of the means of production (other than the part incorporated into net product for expanded reproduction), rendering invisible a significant proportion of current production and the entire sphere of exchanges between capitalist producers. Second, the NI's concept of value of money short-circuits the real structures, processes and relations mediating the expression of social labour into money, which Marx was at pains to identify across the three volumes of *Capital*. This weakens the NI's ability to examine disequilibrium, conflict and crises logically rather than arbitrarily. Third, the NI definition of value of labour power is limited to one of the effects of exploitation, the inability of the workers to purchase the entire net product. This was also the same aspect of exploitation which the Ricardian socialist and Sraffian economists contemplated. However, for Marx, capitalist exploitation is not due to the unfair distribution of income, and the net product is not 'shared' between the classes at the end of each production cycle. Rather, wages are part of the advance of capital (regardless of when they are paid), whilst profit is the consequence of how much surplus value is extracted. In sum, while addressing crucial issues for value theory, the NI resolves none of them. Rather, it confines value theory to a sequential if not static sociological theory of exploitation in which selective aspects of Marx's transformation are subject to piecemeal (and arbitrary) attention, independently of the structures and processes by which surplus value is produced and distributed competitively through the market.

(C) DYNAMIC ANALYSIS

Ben Fine (1983) offered a specific dynamic interpretation of the TVPP (see also Saad Filho 2002, ch. 7). This interpretation departs from (a critique of) conventional views, which tend to focus on the differences in the 'value' composition of capital across different sectors (although often, incorrectly, referring to as differences in OCCs). Paradoxically, nearly all treatments of the TVPP, especially but not exclusively those who reject Marx, deploy the OCC in terminology but the VCC conceptually. However, this is not the case for Marx, who examines the transformation entirely in terms of the OCC, properly conceived and distinguished from the VCC: for him, the TVPP is concerned with the effects on prices of the differing 'rates of increase' at which raw materials are transformed into outputs (rather than the effect of differences in the input values, which are captured by the VCC). This attaches Marx's TVPP to the preceding theory of accumulation and productivity theory of *Capital I*, the circulation of capital from *Capital II* and to the law of the tendency of the rate of profit to fall that immediately follows upon the TVPP in *Capital III*. For standard interpretations of the TVPP, there is no reason why it should not come earlier than *Capital III*, and none why it should have any connection to falling profitability (and, not surprisingly, equilibrium interpretations of the TVPP as transformation problems are heavily associated with denial of Marx's treatment of falling profitability).

For this dynamic view, Marx's problem is the following. If a given amount of living labour employed in sector i (represented by v_i) works up a greater quantity of raw materials (represented by c_i) than in another sector j, 'regardless of their respective costs', the commodities produced in sector i will command a higher price relative to value. That is, the use of a greater quantity of labour in production creates more (surplus) value than a lesser quantity, regardless of the sector, the use value being produced and the cost of the raw materials. This completely general proposition within value theory underpins Marx's explanation of prices and profit. The use of the OCC rather than the VCC in the transformation is significant, because the OCC connects profits with the 'production' of value and surplus value by living labour. In contrast, the VCC links profits with the sphere of 'exchange', where commodities are traded and where the newly established values measure the rate of capital accumulation.

His emphasis on the OCC shows that Marx is mainly concerned with the impact on prices of the different 'quantities' of labour transforming the means of production into the output, regardless of the value of these means of production. This is analytically significant because it pins the source of surplus value and profit down to unpaid labour, substantiating Marx's claims that machines do not create value, that surplus value and profit are not due to unequal exchange, and that industrial profit, interest and rent are shares of the surplus value produced by the productive wage workers. In short, the passage from abstract value to the complex form of prices involves a multiplicity of structures and processes, which need to be ordered in relation to one another and distinctively. This cannot be done by a direct mediation between values and (equilibrium) prices, monetary or otherwise. Furthermore, for this interpretation Marx's own selection of the distinctive role of the TCC, OCC and VCC in the processes of price formation has been seriously misread even by sympathetic interpretations.

CONCLUSION

Commodity values and prices can be analysed at distinct levels. At the most abstract level, value is a social relation of production. Value can also be seen, at increasingly complex levels, as the labour time socially necessary to reproduce each kind of commodity, direct price, price of production, price of production in the presence of commercial capital and market price. The value form is transformed at each one of these levels of analysis; as it becomes increasingly concrete, it encompasses more complex determinations of the value relations of capitalism. The development and implications of these analytical shifts comprise a large part of Marx's work in *Capital*.

In the TVPP, Marx is not addressing the Ricardian (and neoclassical) problem of calculating equilibrium prices from labour magnitudes in the presence of capital and time; rather, Marx is attempting to capture conceptually a relatively complex 'form of social labour'. This approach has a four-fold impact upon the structure of *Capital*: it explains why market exchanges are not directly regulated by labour time; shows that price is a relatively complex form of social labour; allows a more complex understanding of the forms of value; and explains the distribution of labour and surplus value across the economy. Even though it was left incomplete, Marx's procedure is important because it develops further his reconstruction of the capitalist economy, and substantiates the claim that living labour alone, and not the dead labour represented by the means of production, creates value and surplus value.