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The Transformation of Ricardo's Principles Through the Addition of the 'On Machinery' Chapter

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SUMMARY

It is generally believed that the addition of the "On Machinery" chapter to the third edition of the Principles little changed Ricardo's basic analysis of the accumulation process in early nineteenth century England. However, Ricardo's admission - and reversal of his former opinion - that involuntary unemployment might well occur with the introduction of labor-displacing machinery does alter the relationship between landlords, capitalists, and laborers, as well as change the opportunities for capital accumulation. This paper examines these changes, and their impact upon the conception of the first two editions of the Principles.

In order to understand the changes that the added "On Machinery" chapter imposes on the argument of the Principles in its third edition, let us first briefly survey the conception of the economy Ricardo elaborates in his first two editions. Our focus is the growth of production over time in a society of three income classes, landlords, capitalists, and laborers.
Agricultural land is limited in extent and quality, while population grows at a constant rate. Since technical progress is insignificant in the argument of the first two editions, we will assume that all capital accumulation proceeds through savings out of profits of capitalists, and extends production upon the existing ratio of fixed to circulating capital.

Rent received by landlords is explained by Ricardo, together with Malthus, West, and Torrens, as the surplus produce upon infra-marginal land, or as the surplus produce resulting from the infra-marginal applications of labor plus implements to land already under cultivation. As the population increases, agricultural production is extended to lesser land or proceeds more intensively on already cultivated land. The extension of production exhibits diminishing returns, such that formerly marginal agricultural production becomes infra-marginal, and thus earns a rent.

Wages earned by laborers are equal to the commodity cost of reproducing laborers' subsistence. Ricardo allows that the standard of subsistence is historically established and may vary from one country to the next and over time. The principal component of subsistence is the corn or wheat grown on domestic land.

Ricardo treats profits as a residual form of income. Capitalists receive the difference between the value of their product and their costs, the chief component of the latter being wages paid to laborers. The rate of profit is determined as the ratio of labor in production beyond that necessary for laborers' subsistence to the labor necessary for production of that subsistence. A uniform rate of profit is established by the free flow
of capital between sectors of production.

The uniform rate of profit, however, does not remain constant as population increases in the presence of a fixed supply of agricultural land. As labor productivity declines in agriculture, subsistence becomes more expensive in terms of the labor-time quantity of direct labor and implements required for production of a given quantity of corn, wages rise, and profits are reduced. Rising rents accordingly come to occupy an increasingly larger share of surplus product at the expense of the profit share. In the long run, should this process continue uninterrupted, the profit rate falls until accumulation is halted.

This destination, nonetheless, was not an inevitable one in Ricardo's view. His analysis permitted identification of the obstacles to continued accumulation in a manner that left little doubt about how they might be overcome. Thus,

Profits of stock fall only, because land equally well adapted to produce food cannot be procured .... If, therefore, in the progress of countries in wealth and population, new portions of fertile land could be added to such countries, with every increase of capital, profits would never fall, nor rents rise.¹

Of course "new portions of fertile land" would need to be added from beyond English borders since England possessed a limited quantity of agricultural land. The system of import duties, then, was a key obstacle to continued capital accumulation, together with landlord intransigence to their reduction.

Technical progress might also permit continued accumulation of capital, since it would enable postponement of the diminishing returns in agriculture. In the Essay on Profits Ricardo had suggested this when he rhetorically challenged landlords' resis-
tance to reduced import duties by likening their tariff position to an opposition to agricultural improvements. Despite this early recognition of the dual character of the constraint on capital accumulation, however, it cannot be said that technical improvements played the same role in the first two editions of the *Principles* as did reduction of import duties. Ricardo not only devotes comparatively more discussion to the reduction of import duties, but, also, he only initiates a careful investigation of technical improvements in the added "On Machinery" chapter. In addition, as we will see, that Ricardo's famous pessimism concerning the prospects for continued accumulation is absent in the added chapter suggests that technical improvements ultimately in his view possessed a special role in the accumulation process distinct from that of duty reductions.

Let us, then, now turn to the third edition and the added "On Machinery" chapter. The salient feature of this chapter's addition to the *Principles* is Ricardo's retraction and reversal of his previous view of the social impact of technical progress. Sraffa summarizes this in his "Introduction" to the *Principles*:

"The most revolutionary change in edition 3 is the new chapter On Machinery, in which Ricardo retracts his previous opinion that the introduction of machinery is beneficial to all the different classes of society." More specifically, Ricardo concluded that the introduction of labor-displacing machinery was detrimental to the interests of the working class, since it created involuntary unemployment. He had formerly denied machinery introduction created involuntary unemployment in a speech in Parliament on 16 December 1819, and his
reversal apparently came about in part on account of John Barton's Observations on the Circumstances which Influence the Condition of the Labouring Classes of Society published in 1817, and favorably cited in the added chapter to the Principles.

The "On Machinery" chapter itself is divided into two parts, neither of which is titled nor otherwise identified. The first presents Ricardo's analysis of the introduction of labor-displacing machinery by means of a numerical example. The latter reviews the conclusions of the first in light of policy recommendations regarding the involuntarily unemployed. In the chapter on the whole Ricardo's retraction is expressed in both qualitative and quantitative terms.

In the qualitative sense, Ricardo disavows his previously held view that each of the three main classes of society is benefited by the introduction of labor-displacing machinery in any sector of production. Formerly he had believed that those rendered redundant in one sector of production inevitably found re-employment in other sectors. At the same time, since the labor-time requisite for those commodities produced with less labor and more machinery was altogether reduced, each of the three classes would be equally benefited by being able to purchase these commodities at lower prices. However, were some laborers to remain involuntarily unemployed, as Ricardo came to admit, clearly they would be unable to enjoy the reduced prices on reduced incomes. Further, were wages in general to be depressed by the appearance of significant numbers of unemployed, then the introduction of labor-displacing machinery was, Ricardo concluded, "often very
injurious to the interests of the class of labourers."

In the quantitative sense, Ricardo expresses his retraction in terms of the differential movements of a society's gross and net incomes. In the first two editions of the *Principles* he had held that when a society's net income increased, so also did its gross income in the same proportion. In the added chapter, however, he asserts:

I, now, however, see reason to be satisfied that the one fund, from which landlords and capitalists derive their revenue may increase, while the other, that upon which the labouring class mainly depend, may diminish, and therefore it follows, if I am right, that the same cause which may increase the net revenue of the country, may at the same time render the population redundant, and deteriorate the condition of the labourer.

This assertion is followed by the chapter's numerical example, illustrating how involuntary unemployment may result from the replacement of labor and circulating capital by machinery and fixed capital.

In the latter section of the chapter, then, Ricardo entertains policy proposals concerning those involuntarily unemployed. While he contemplates the possibility that with lower commodity prices capitalists might be able to satisfy their wants at a sufficiently lesser expense that their savings might be re-invested in additional production to return all of the unemployed to production, clearly were this generally likely the retraction of the chapter would have been unnecessary. Accordingly, Ricardo's proposals are worth serious attention.

Before turning to these, however, let us consider the impact of Ricardo's admission of involuntary unemployment on the analytical argument of the original *Principles*. Specifically, since
Ricardo did not revise his discussion in the balance of the Principles in light of the added chapter, we must turn to his formulation of the long run in the chapter itself to establish this shift in perspective. Thus, after the numerical example, Ricardo reminds us of his original analysis in the first two editions when import duties prevail in a country of limited agricultural land:

> With every increase of capital and population, food will generally rise, on account of its being more difficult to produce.

He then continues, in contrast to his earlier projection of rising rents and stagnation,

> The consequence of a rise of food will be a rise of wages, and every rise of wages will have a tendency to determine the saved capital in a greater proportion than before to the employment of machinery. Machinery and labor are in constant competition, and the former can frequently not be employed until labor rises.⁶

The "rise of wages," that is, no longer entails the fall in profits originally anticipated, but rather "a tendency to determine the saved capital in a greater proportion than before to the employment of machinery." Moreover, now, it is machinery and labor that are in "constant competition," rather than land and capital as earlier claimed.

The conflict between landlords and capitalists of the first two editions of the Principles, thus, is now circumvented by the capacity of capitalists to discharge laborers from production whenever wages begin to rise. That is, as long as fixed capital is perfectly substitutable for circulating capital, any rise in the price of the circulating immediately entails its replacement with fixed. Wages, therefore, do not rise in these circumstances, nor, furthermore, do rents. Replacement of laborers by machinery
means that the margin of cultivation no longer need be extended - regardless of whether import duties are reduced - and accordingly the conflict between capitalists and landlords envisioned in the first two editions is dissipated. It might be added that should machinery introduction cheapen the prices of machinery more than the prices of commodities produced with machinery, then laborers would be expelled from production at an even greater rate.

At the same time, laborers no longer simply see the labor-time corn cost of their wages rise as capital is accumulated and population grows, but now rather see unemployment rise, should the population continue to grow at the same rate. Thus, just as formerly conflict was absent between laborers and capitalists when rising rents threatened capital accumulation, so now, in the context of the argument of the "On Machinery" chapter, conflict is absent between landlords and capitalists, while a new threat to capital accumulation appears in laborers' rising discontent over mounting unemployment and falling wages.

The transformed perspective of the third edition of the Principles, therefore, required of Ricardo an elaboration of new policies appropriate to continued capital accumulation. Two proposals occupy the concluding pages of the added chapter.

First, Ricardo suggests that unless the individual with an undiminished net income, namely, the capitalist "expends his revenue in the manner of an ancient baron, in the support of a great number of retainers, or menial servants," employment may well be insufficient for the great number of laborers rendered
redundant by machinery introduction. That is, private service for menials would become available should capitalists not spend their incomes on "fine clothes, or costly furniture; on carriages, on horses, or in the purchase of any other luxuries," but rather upon coarse cloth and corn which they might exchange for the personal services of formerly employed laborers.  

Secondly, Ricardo suggests the continuation of taxes levied during the recent Napoleonic Wars, and their expenditure upon unemployed laborers enlisted into military service. He confesses:

If I were not called upon for a tax ... which is expended on men in the situations of soldiers and sailors, I might probably expend that portion of my income on furniture, clothes, books, &c. &c. and whether it was expended in the one way or in the other, there would be the same quantity of labour employed in production; for the food and clothing of the soldier and sailor would require the same amount of industry to produce it as the more luxurious commodities; but in the case of war, there would be the additional demand for men as soldiers and sailors; and, consequently, a war which is supported out of the revenue, and not from the capital of a country, is favourable to the increase of population.  

Labor redundant to production, then, may be supported in public service in England's armies and fleets, so that it will not be necessary, Ricardo explains, to "sink the value of wages, and very materially deteriorate the condition of the labouring classes." Presumably, maintaining the level of wages was sufficient in Ricardo's view to dispel discontent of laborers that might prove an obstacle to capital accumulation.

It should be added, to emphasize the significance of these two proposals, that Ricardo nowhere in the "On Machinery" chapter suggests that labor-displacing machinery introduction should be discouraged on account of its creation of involuntary unemploy-
ment. On the contrary, he argues that the consequence of doing so is to drive capital abroad, which he regards as "a much more serious discouragement to the demand for labour." Thus the conflict between capital and labor is unavoidable in his view, and the proposals for re-employment quite central to the continued and uninterrupted flow of capital accumulation.

Still, it cannot be said that Ricardo perceived this conflict to be as severe and momentous as that between landlords and capitalists. The implicit optimism of the "On Machinery" chapter contrasts with the more serious concern of the earlier Principles and the warnings of stagnation. On the one hand, then, Ricardo lacked Marx's understanding of the historical importance of the labor-capital conflict, while on the other hand, his own analysis of labor-displacing machinery introduction not only anticipated some of the issues central to Capital, but also went beyond what Marx was to argue. Specifically, though Marx too was optimistic about the labor-capital conflict, it was for reasons opposite to those of Ricardo. Marx, that is, expected the conflict to overcome capital, and thus did not anticipate capital's resilience. Ricardo, by contrast, intimated the potential for management of this conflict in the growth of service employment and in the role of the state. Whether he also foresaw England's nineteenth century overseas involvement, and its connection to technical progress remains to be determined.
Footnotes


