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Ricardo and Morishima on Machinery

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(1)

Following John Barton's Condition of the Labouring Classes of Society (1817), Ricardo admitted, in the third edition (1821) of his Principles, that the process of mechanization may prove injurious to the working class.[1] In his Ricardo's Economics (1989), however, Morishima claims that he "carefully investigates Ricardo's chapter on machinery and shows that the introduction of machinery does not create unemployment." (Morishima (1989) 1 p. 14). In view of the importance of Ricardo's machinery problem in the history of economic thoughts[2] as well as its applicability in past and current cases of rapid industrialization,[3] it may perhaps be worthwhile to scrutinize Morishima's criticism on Ricardo carefully.

Ricardo derives his conclusion from two numerical examples, which are explained detailedly in section (2) below. Then, follow our interpretations of Ricardo's first example in section (3) and of Morishima's corrected version of it in section (4). Section (5) is devoted to consider Morishima's discussion of the latter critically. Our interpretation of Ricardo's second example will be given in section (6), while Morishima's argument on it will be considered in section (7). Section (7) refers also to the question of unproductive labor. Finally, section (8) concludes our study.

In Chapter XXXI On Machinery of the third edition of his _Principles_, Ricardo gave two numerical examples concerning the effects of the employment of machinery on the demand for labor. The first example is concerned with the application of machinery in the wage goods industry, while the second is on the employment of machinery in a non-wage goods industry. The first is regarded by Ricardo as the most simple case which he could select (Ricardo (1951), p. 390) and is described as follows.

"A capitalist we will suppose employs a capital of the value of 20,000_l_. and that he carried on the joint business of farmer, and a manufacturer of necessaries. We will further suppose, that 7000_l_. of this capital is invested in fixed capital, viz. in buildings, implements, &c. &c. and that the remaining 13,000_l_. is employed as circulating capital in the support of labour. Let us suppose, too, that profits are 10 per cent., and consequently that the capitalist's capital is every year put into its original state of efficiency, and yields a profit of 2000_l_." (Ricardo (1951), p. 388). "Each year the capitalist begins his operations, by having food and necessaries in his possession of the value of 13,000_l_., all of which he sells in the course of the year to his own workmen for that sum of money, and, during the same period, he pays them the like amount of money for wages: at the end of the year they replace in his possession food and necessaries of the value of 15,000_l_., 2000_l_. of which he consumes himself, or disposes of as may best suit his pleasure and gratification. As far as these products are concerned, the gross produce for that year is 15,000_l_., and the net produce 2000_l_. Suppose now, that the following year the capitalist

employs half his men in constructing a machine, and the other half in producing food and necessaries as usual. During that year he would pay the sum of 13,000l. in wages as usual, and would sell food and necessaries to the same amount to his workmen; but what would be the case the following year?" (Ricardo (1951), pp. 388-9).

"While the machine was being made, only one-half of the usual quantity of food and necessaries would be obtained, and they would be only one-half the value of the quantity which was produced before. The machine would be worth 7500l. and the food and necessaries 7500l., and, therefore, the capital of the capitalist would be as great as before; for he would have besides these two values, his fixed capital worth 7000l., making in the whole 20,000l. capital, and 2000l. profit. After deducting this latter sum for his own expenses, he would have a no greater circulating capital than 5500l. with which to carry on his subsequent operations; and, therefore, his means of employing labour, would be reduced in proportion of 13,000l. to 5500l., and, consequently, all the labour which was before employed by 7500l., would become redundant." (Ricardo (1951), p. 389).

Compared with the first example, which was called as the most simple case, the second example would be more complicated. While the first was described rather detailedly by Ricardo, as quoted in the above, however, merely an abstract and rather vague sketch was given by him to the second case, possibly because "it would make no difference in the result, if we supposed that the machinery was applied to the trade of any manufacturer, -- that of a clothier, for example, or of a cotton manufacturer." (Ricardo (1951), pp. 390 - 391).

"If in the trade of a clothier, less cloth would be produced after

the introduction of machinery; for a part of that quantity which is disposed of for the purpose of paying a large body of workmen, would not be required by their employer. In consequence of using the machine, it would be necessary for him to reproduce a value, only equal to the value consumed, together with the profits on the whole capital. $7500\underline{l}$. might do this as effectually as $15,000\underline{l}$. did before, the case differing in no respect from the former instance. It may be said, however, that the demand for cloth would be as great as before, and it may be asked from whence would this supply come? But by whom would the cloth the demanded? By the farmers and the other producers of necessaries, who employed their capitals in producing these necessaries as a means of obtaining cloth: they gave corn and necessaries to the clothier for cloth, and he bestowed them on his workmen for the cloth which their work afforded him." (Ricardo (1951), p.391).

"This trade would now cease; the clothier would not want the food and clothing, having fewer men to employ and having less cloth to dispose of. The farmers and others, who only produced necessaries as means to an end, could no longer obtain cloth by such an application of their capitals, and, therefore, they would either themselves employ their capitals in producing cloth, or would lend them to others, in order that the commodity really wanted might be furnished; and that for which no one had the means of paying, or for which there was no demand, might cease to be produced. This, then, leads us to the same result; the demand for labour would diminish, and the commodities necessary to the support of labour would not be produced in the same abundance." (Ricardo (1951), p. 391).

In spite of Morishima (1989)'s assertion that we can find a general
equilibrium system concealed within Ricardo's economics (Morishima
(1989), p.3), Ricardo confined himself within the partial equilibrium
analysis, at least, in the discussion of the case of a wage goods industry
in the first example quoted in section (2). What enables him to do so
is the assumption that the fixed capital does not depriciate, so that it
need not to be replaced though it yields profit at the same rate as the
circulating capital does. This is because otherwise repercussions to
non-wage goods industries have to be taken into consideration and the
general equilibrium analysis has to be applied, unless fixed capital
consists all of wage goods in the wage goods industry. Of course the
assumption is stringent, but it can be defended if fixed capital consists
of capital goods which are by nature highly durable and do not depreciate
very much, and/or if the consideration is confined to the effects in the
very short run.

In this respect, the assumption is made clearer in the example
considered by J.S. Mill to the same effect. "Suppose that a person
farms his own land, with a capital of two thousand quarters of corn,
employed in maintaining labourers during one year (for simplicity we
omit the consideration of seed and tools), whose labour produces him
annually two thousand four hundred quarters, being a profit of twenty
per cent. -- Let us now suppose that by the expenditure of half his
capital he effects a permanent improvement of his land, which is executed
by half his labourers, and occupies them for a year -- At the end of the
year, -- the improver has not, as before, a capital of two thousand

quarters of corn. Only one thousand quarters of his capital have been reproduced in the usual way; he has now only those thousand quarters and his improvement." (Mill (1909), p. 94). The fixed capital and machinery of Ricardo's example are changed into the land and its permanent improvement.

Returning to Ricardo's first example, we have the accounting equation of wage goods (food and necessaries) industry

$$
(1) \quad \underset{\text{produce}}{\overset{\text{gross}}{15{,}000}} = \underset{\text{capital}}{\overset{\text{circulating}}{13{,}000}} + \underset{\text{capital}}{\overset{\text{total}}{20{,}000}} \times \underset{\text{profit}}{\overset{\text{rate of profit}}{0.1}}
$$

in view of the assumption that fixed capital (7,000) does not depreciate. Since profits are assumed to be consumed, we have a stationary state or simple reproduction in which there are neither savings nor capital accumulation. Each year the same number of laborers are employed with the circulating capital 13,000, which is reproduced with profits 2000, and the same process repeats for ever.

Suppose now that the industry is divided into two sections. In section 1, food and necessaries are produced as usual but with only the half capital 10,000, i.e., fixed capital 3,500 and circulating capital 6,500, while a machine is constructed in section 2 with the remaining capital 10,000, i.e., fixed capital 3,500 and circulating capital 6,500. Equations of two sectors are

$$
(2) \quad \underset{\text{goods}}{\overset{\text{wage}}{7{,}500}} = \underset{\text{capital}}{\overset{\text{circulating}}{6{,}500}} + \underset{\text{capital}}{\overset{\text{total}}{10{,}000}} \times \underset{\text{profit}}{\overset{\text{rate of}}{0.1}}
$$

and

	machine	circulating	total	rate of
(3)		capital	capital	profit

$$7,500 = 6,500 + 10,000 \times 0.1$$

with the result that the industry has food and necessaries 7,500, a machine 7,500 and fixed capital 7,000 at the end of the year.

Since profits 2,000 are consumed on food and necessaries, however, in the following year the industry starts with total capital 20,000 unchanged, the composition of which is now fixed capital 7,000, a machine 7,500 and circulating capital (food and necessaries) only 5,500. Demand for labor is reduced from 13,000 to 5,500. Equation (1) is now replaced by

	gross	circulating	total	rate of
(4)	produce	capital	capital	profit

$$7,500 = 5,500 + 20,000 \times 0.1$$

if the rate of profit remains unchanged. "The reduced quantity of labour which the capitalist can employ, must, indeed, with the assistance of the machine, and after deductions for its repairs, produce a value equal to 7500l., it must replace the circulating capital with a profit of 2000l. on the whole capital." (Ricardo (1951), p. 389).

So far we assumed that the profits of the wage goods industry are entirely consumed on its produce, i.e., food and necessaries. If they are consumed entirely on a different, non-wage good, however, we have to consider that there is another industry which produces such a good. Assuming that the ratio of fixed and circulating capitals is identical to that in the wage-goods industry before the introduction of machinery, the accounting equation of the non-wage good industry is

$$
\begin{array}{lllll}
& \text{gross} & \text{circulating} & \text{total} & \text{rate of} \\
(5) & \text{produce} & \text{capital} & \text{capital} & \text{profit} \\
& 2307 & = 2000 & + 3073 & \times 0.1
\end{array}
$$

since its fixed capital is 1073. The profit 307 is consumed on its own

produce while its circulating capital is replaced through the exchange

with the wage goods industry, i.e., by the consumption of the profits of

the latter industry. Provided that the profits of the wage goods industry

remain unchanged, therefore, the employment of machinery there does not

have any repercussions on this non-wage good industry. In other words,

still there is no need for the general equilibrium or inter-industry

analysis.[4)]

(4)

Morishima (1989) starts his criticism on Ricardo by correcting the

latter's numerical example (the first example) so that the accounting

equation (1) is changed into

$$
\begin{array}{lllll}
& \text{gross} & \text{fixed} & \text{circulating} & \text{profits} \\
(6) & \text{produce} & \text{capital} & \text{capital} & \\
& 22{,}000 & = 7{,}000 & + 13{,}000 & + 2{,}000
\end{array}
$$

and insists that the difference between the two gross products, i.e.,

22,000 in (6) versus 15,000 in (1), is not a matter of definition, but

arises from Ricardo's incorrect methods of accounting (Morishima (1989),

p. 171). We agree that the difference is not a matter of definition,

but consider that it arises, not from Ricardo's error, but from the

difference in assumptions. While Ricardo assumed that fixed capital

does not depreciate, Morishima assumes that it depreciates entirely in a

single period. As we admitted that Ricardo's assumption is a stringent

one in section (3), it is certainly worthwhile to consider an alternative
assumption, even though it is equally stringent.

If we follow Morishima to assume that the fixed capital depreciates
entirely in a single period, there must be an industry producing fixed
capital goods which has the accounting equation

	gross	fixed	circulating	profits
(7)	produce	capital	capital	

$$10,266(2/3) = 3,266(2/3) + 6,066(2/3) + 933(1/3)$$

though Morishima does not give (7) explicitly. It is assumed that two
industries have identical ratio between fixed and circulating capitals,
and the rate of profit is 10 per cent. If the profits are assumed to be
consumed on food and necessaries, the condition for an inter-industry
equilibrium is that the fixed capital depreciated in the food and necessaries
industry is equal to the sum of circulating capital and profits in the
fixed capital good industry, which is satisfied in (6) and (7), since

(8) $\qquad 7,000 = 6,066(2/3) + 933(1/3)$.

Both fixed and circulating capitals are replaced in two industries and
the stationary state or simple reproduction can be maintained.

Suppose now that the food and necessaries (wage goods) industry is
divided into two sections. In section 1, food and necessaries are produced
as usual but with only the half capital 10,000, i.e., fixed capital 3,500
and circulating capital 6,500, while a machine is constructed in section 2
with the remaining capital 10,000, i.e., fixed capital 3,500 and circulating
capital 6,500. Equations of two sectors are, instead of (2) and (3),

	wage	fixed	circulating	profits
(9)	goods	capital	capital	

$$11,000 = 3,500 + 6,500 + 1,000$$

and

(10)
	machine	fixed capital	circulating capital	profits
11,000	= 3,500	+ 6,500		+ 1,000

with the result that the industry has a machine 11,000, fixed capital 7,000 and circulating capital 2,000 at the end of the year. This is because, out of gross produce 11,000 of food and necessaries, 7,000 are exchanged against fixed capital goods, and 2,000 are consumed by capitalist. Total capital is maintained at 20,000 but the demand for labor in the following year is reduced from 13,000 to 2,000.

If we consider that the original intention of Ricardo in his first example is to construct a machine of value 7,500, rather than to employ a half of the capital (and labor) to construct a machine, the accounting equations (9) and (10) of the wage goods industry have to be modified as follows.

(11)
wage goods	fixed capital	circulating capital	Profits
14,500 = 4,614	+ 8,568	+ 1,318	

and

(12)
	machine	fixed capital	circulating capital	profits
7,500	= 2,386	+ 4,431		+ 682

where the industry's total gross produce 22,000 (= 14,500 + 7,500), fixed capital 7,000 (= 4,614 + 2,386), circulating capital 13,000 (+ 8,568 + 4,431) and profits 2,000 (= 1,318 + 682) are kept unchanged from those in (9) and (10). At the end of the year, the industry now has a machine 7,500, fixed capital 7,000 and circulating capital 5,500.

This is because, out of gross produce of food and necessaries 14,500, 7,000 are exchanged against fixed capital goods, and 2,000 are consumed by capitalist. Total capital is maintained at 20,000 but the demand for labor in the following year is reduced from 13,000 to 5,500.

Thus, the implication of Ricardo's first example remains unchanged, even if his assumption on fixed capital is substituted by Morishima's assumption. Particularly, the demand for labor is reduced, by the construction of a machine of value 7,500, in proportion of 13,000 to 5,500, both in the cases of Ricardo's and Morishima's assumptions. Ricardo's assumption does work, therefore, as a simplifying assumption to consider the immediate effects of construction and employment of machinery in a stationary economy, since it can dispense with an application of general equilibrium or inter-industry analysis.

(5)

In the previous section, we showed that an introduction of labor saving machines would create unemployment of labor, even if we accept Morishima's "correction" of Ricardo's numerical example. Morishima derives, however, differently from his corrected numerical example. "The demand for labour after the production of machines will be the same as before such an operation was commenced; thus, it does not cause unemployment." (Morishima (1989), p. 174).

Morishima begins with correcting Ricardo's numerical example and gives the accounting equation of "a capitalist who carries on the joint business of producing food (corn) and manufactured necessaries"

	gross	fixed	circulating	profits
(6)	produce	capital	capital	

$$22,000 = 7,000 + 13,000 + 2,000$$

which we already discussed in section (4). "There exists the produce
worth £22,000, a part of which, worth £13,000, is bought by the worker
of that business, another part worth £2,000 is bought by the capitalist
himself and the remaining part (£7,000) by the workers and capitalists
of the industry producing fixed capital goods" (Morishima (1989), p.
171). Thus, Morishima recognizes the existence of the fixed capital
goods industry which is clearly a different one from the food and necessaries
industry, though the accounting equation of the former industry is not
explicitly given (i.e., (7) in section (4)).

Now following Ricardo, the food and necessaries industry is divided
into two sectors, the food-necessaries sector (sector I) and the
machine sector (sector II), with

Sector I:	gross	fixed	circulating	profits
	produce	capital	capital	

$$11,000 = 3,500 + 6,500 + 1,000$$

Sector II:	gross	fixed	circulating	profits
	produce	capital	capital	

$$11,000 = 3,500 + 6,500 + 1,000$$

accounting equations for sector I and II, respectively (Morishima
(1989), pp. 171 - 172). These two equations are equations (9) and (10)
we considered in section (4). Morishima seems to forget, however, the
existence of the fixed capital goods industry, when he argues that
"after deducting the total profits (£2,000) for the capitalists' consumption

from the gross output of food and necessaries, there would remain £9,000

of circulating capital, with which the subsequent operation could be

carried out. The wage fund would then be reduced from £13,000 to £9,000."

(Morishima (1989), p. 172). As we argued in section (4), the wage

fund should be reduced to £2,000, if we take into consideration the

existence of the industry which has been supplying £7,000 fixed capital

goods to the food and necessaries industry.

Morishima rather considers that this two-sector industry is a self-

sufficing one, in which the fixed capital of section I is to be replaced

by the supply from section II. Then, it turns out that the inter-

sector equilibrium condition (fixed capital of section I = circulating

capital of section II + profits of section II) is not satisfied and

there are £4,000 excess demand for food and necessaries and £4,000

excess supply of machines (fixed capital goods), if both sector produce

£11,000 gross produce. "We have obtained this state of disequilibrium

because Ricardo arbitrarily assumed that half the workers were employed

in the production of machines." (Morishima (1989), p. 173).

If two sectors' accounting equations are

	food and	fixed	circulating	profits
(13)	necessaries	capital	capital	
	15,000	= 4,773	+ 8,864	+ 1,364

and

	machines	fixed	circulating	profits
(14)		capital	capital	
	7,000	= 2,227	+ 4,136	+ 637

the inter-sector equilibrium condition is satisfied, since 4,773 = 4,136 +

637. From (13) and (14), Morishima concludes that "the demand for

labour after the production of machines will be the same as before such

an operation was commenced; thus, it does not cause unemployment. In

Ricardo's example unemployment is generated because the labour force is

distributed between the two sectors in the wrong proportions." (Morishima

(1989), p. 174).

Morishima is right to consider that Ricardo "included machines, as

well as other capital goods such as implements, tools and buildings" in

his definition of fixed capital, and that "Ricardo obviously allowed for

machines in his theory of value." (Morishima (1989), p. 170). It is

also true that Ricardo maintained full employment in his theory of value.

What Morishima shows us by the use of (13) and (14) is, then, that a full

employment stationary equilibrium is possible, if initially there exists

a sufficient wages fund (food and necessaries) to employ all the labor

at the natural wage (so that there is no change in the population),

and if the initial ratio of fixed and circulating capitals is at its

equilibrium (i.e., 7/13). The existence of machines as such in the

fixed capital does not prevent the economy from achieving the full employment.

The problem solved by Morishima is, however, the problem of Ricardo's

theory of value, and not the problem of his machinery chapter. In the

former, not only the total capital, but also the proportion between fixed

and circulating capitals are kept unchanged. The fixed capital 7,000 can be

machines, but they are merely replaced and not increased. In the latter,

on the other hand, machinery is newly and suddenly introduced, or machines

are increased, at the expense of the reproduction of wages fund, though

the total capital is kept unchanged. As was shown in section (4), fixed

capital including machines increases from 7,000 to 14,500 while circulating

capital is reduced from 13,000 to 5,500. Two problems are clearly different

ones. As far as Ricardo's first example is concerned, therefore, Morishima's criticism on Ricardo seems to miss the mark.

(6)

Let us now consider the second numerical example of Ricardo (see section (2) above). It is concerned with the introduction of machinery in a non-wage goods industry. This interpretation can be confirmed by the following elucidation given by Mangoldt (1868). "Das Ergebnisz stellt sich indessen auch dann nicht anders heraus, wenn es sich um eine Unternehmung handelt, welche andere Güter, als die unmittelbar von den Arbeitern begehrten, erzeugt. Es sei z. B. eine Seidenmanufaktur, wo die Einführung der Maschines von einer Verminderung des Roherzeugnisses begleitet sei." (Manglodt (1868), p. 169). Following Mangoldt, let us call the industry in question silk (Seide) industry and assume that all the profits are spent on silk.

The accounting equation of silk industry is

$$
\begin{array}{llll}
& \text{gross} & \text{circulating} & \text{profits} \\
(15) & \text{produce} & \text{capital} & \\
& 15,000 & = 13,000 & + 2,000
\end{array}
$$

in view of Ricardo's assumption that fixed capital (7,000) does not depreciate. To replace the circulating capital of silk industry, the profits of other industries should also be 13,000. If the wage goods (food and necessaries) industry represents other industries, its accounting equation should be

$$
\begin{array}{llll}
& \text{gross} & \text{circulating} & \text{profits} \\
(16) & \text{produce} & \text{capital} & \\
& 97,500 & = 84,500 & + 13,000
\end{array}
$$

since it has fixed capital 45,500 so that the ratio of fixed and circulating capital is 7/13 and the rate of profit is 10 per cent.

As in the case of the wage goods industry in the first example, the capitalists of silk industry introduce machinery by constructing a machine with a half of their men. Silk industry is now divided into two sections and their accounting equations are

	silk	circulating capital	profits
(17)	7,500	= 6,500	+ 1,000

and

	machine	circulating capital	profits
(18)	7,500	= 6,500	+ 1,000

so that the gross produce (Roherzeugnisses) of silk is reduced from 15,000 to 7,500. At the end of the year, the total capital of silk industry is still 20,000 but its composition is fixed capital 7,000, a machine 7,500 and circulating capital 5,500, since the industry could sell only 5,500 to the wage goods industry after the consumption of its profit 2,000 on its own product.

In the following year, the accounting equation of silk industry is

	silk	circulating capital	profits
(19)	7,500	= 5,500	+ 2,000

if we assume that machine does not depreciate. In comparison with (15) and (19), the gross produce, which is necessary to reproduce capital with profits, is reduced from 15,000 to 7,500 by the introduction of machinery, as was correctly anticipated by Ricardo. "75000l. might do this as effectually as 15,000l. did before, the case differing in no respect from the former instance." (Ricardo (1951), p. 391).

In view of (16), however, there remains unsatisfied demand 7,500

(= 13,000 - 5,500) for silk, since silk industry can now supply only

5,500 to the wage goods industry after its profits 2,000 is spent on

silk. To satisfy their demand for silk, capitalists in the wage goods

industry would themselves employ their capital to produce silk, with

the result that wage goods industry is now divided into two sections,

having accounting equations

	silk	circulating capital	profits
(20)	7,500 =	6,500	+ 1,000

and

	wage goods	circulating capital	profits
(21)	90,000	= 78,000	+ 12,000

in which fixed capital 3,500 is used for silk production and 42,000 for

wage goods production.

The assumption that the rate of profit remains unchanged can be

justified in the case of second example, since the method of production

is changed only in a non-wage goods industry, i.e., silk industry while

the rate of profit is determined in the production of wage goods, where

input and output are identical commodities.[5] With unchanged total capital

150,000 (52,500 fixed capital and 97,500 circulating capital), then,

total profits and demand for silk remains unchanged. Demand for labor

to produce silk is, however, reduced from 13,000 to 12,000 (= 5,500 +

6,500) in spite of the following statement of Mangoldt to the contrary.[6]

"Es kann sein, dasz bei dieser veränderten Verwendung des umlaufenden

Capitals auf die Production von Seidenwaaren, statt bisherauf Unterhaltsmittel,

die entlassenen Seidenarbeiter wieder Beschafting finden, alsdann aber

würde eine entsprechende Zahl von Arbeiten die bisher Unterhalsmittel

für jene producirten, die ihrige verlieren müssen." (Mangoldt (1868), p. 170).

The reason is, of course, the introduction of machinery in the original

silk industry. Demand for labor in the production of wage goods is also

reduced from 84,500 to 78,000. Total reduction in the demand for labor

is, of course, equal to the reduction of the production of wage goods,

i.e., 7,500.

(7)

Morishima (1989)'s interpretation of the second example of Ricardo

is very different from ours in section (6). "Next, Ricardo was concerned

with the case of mechanization undertaken by manufactures such as clothiers

or cotton manufactures, which resulted in a substitution between fixed

and circulating capitals in favour of the former. ----- Let us suppose

that those who mechanize their own production process, like Ricardo's

clothier and cotton manufacturer, belong to the food and necessaries

producing sector (sector I). Suppose the proportion of fixed to

circulating capital of sector I was, for example, 7/13 before the

mechanization and is increased to 3 as the result of it." (Morishima

(1989), p. 178). This is rather close to our interpretation of Ricardo's

first example, in which the proportion of fixed and circulating capitals

is 7,000/13,000 before the mechanization and is increased to 14,500/5,500

as the result of it in the wage goods (food and necessaries) industry.

Morishima describes the stationary equilibrium before the mechanization

by

	gross produce	fixed capital	circulating capital	profits
(13) Sector I				+ 1,364
	15,000	= 4,773	+ 8,864	

and

	gross	fixed	circulating	profit
(14) Sector II	produce	capital	capital	
	7,000	= 2,227	+ 4,136	+ 637

where sector I produces food and necessaries and sector II produces

fixed capital goods (machines). After the mechanization of sector I,

according to Morishima ((1989), p. 179), these two equations have to

be changed respectively into

	gross	fixed	circulating	profits
(22)	produce	capital	capital	
	15,888	= 10,833	+ 3,611	+ 1,444

and

	gross	fixed	circulating	profits
(23)	produce	capital	capital	
	15,888	= 5,055	+ 9,389	+ 1,444

in which total circulating capital 13,000 remains unchanged from that in

(13) and (14) in spite of the mechanization in sector I.

As a result of mechanization, total fixed capital is increased from

7,000 in (13) and (14) to 15,888 in (22) and (23), though total circulating

capital remains unchanged and profits are entirely consumed. This is a

story in the Land of Cockaigne (Koopmans (1951), pp. 49 - 50). What

Morishima shows is that mechanization can be easily done without reducing

demand for labor and without making saving from profits, if machines

are freely available like manna, or if they are given free by foreign

countries. Again, Morishima's problem is clearly different from Ricardo's

one in the latter's chapter on machinery. Morishima seems to consider

that Ricardo explained unemployment by the existence of unused wages

fund (Morishima (1989), p. 179). As we have explained, however, Ricardo's problem is different. There is not enough wages fund, since its replacement is sacrificed for the mechanization.

Finally, Morishima criticizes following argument of Ricardo. "If a landlord, or a capitalist, expands his revenue in the manner of an ancient baron, in the support of a great number of retainers, or menial servants, he will give employment to much more labour, than if he expended it on fine clothes, or costly furniture; on carriages, on horses, or in the purchase of any other luxuries." (Ricardo (1951), p. 393). A general equilibrium model is constructed, with the assumption that "it takes one period to produce agricultural products (food), while production is assumed to be instantaneous for all other commodities." (Morishima (1989), p. 180). Then, it is shown that "a change in the consumption pattern has no effect upon the employment of labour." (Morishima (1989), p. 180). Morishima concludes, therefore, that "the demand for labour will be as great as before, even if a capitalist diverts his revenue from expenditure on a luxury good to another good." (Morishima (1989), pp. 181 - 182).

Morishima's general equilibrium model is, unfortunately, quite non-Ricardian. In the classical economics in general, and in Ricardian economics in particular, production cannot be assumed instanteneous, not only for food, but also for all other commodities. Otherwise, profits cannot accrue to circulating capital, since it is defined as advancement of wages fund to labor to produce commodities. Suppose instead it takes one period to produce any commodity, and the wages fund (stock of food) is given. Then, Morishima is right to argue that "the demand for labour will be as great as before, even if a capitalist diverts his revenue

from expenditure on a luxury good to another good," as far as the demand

for productive labor is concerned. Productive labor is, of course,

supported by wages fund and reproduces it with profits in the production

of commodities.

What Ricardo had in mind is, however, not that "a capitalist diverts

his expenditure on a luxury good to another good," but that he diverts

his expenditure on a luxury good to, say, the employment of "menial

servants." The labor of menial servants is called unproductive labor,

since it is employed not by capital (wages fund) but by revenue, and

no profits accrue to the employers of such a labor. This is, of course,

because the production of the service of menial servants is instanteneous.

If expenditure is diverted from a luxury commodity to the employment of

unproductive labor, the production of the luxury commodity is reduced

and that of food is increased, so that not only the given wages fund is

reproduced but also it is possible to supply for the demand from the

unproductive laborers. Though there is no effect upon the employment of

productive laborers, certainly the total employment of labor is increased

by the employment of such unproductive laborers as menial servants.

(8)

Let us conclude by considering why Morishima tries to criticize

Ricardo's theory of machinery. "Ricardo is well known as a strong

believer in Say's law of markets." (Morishima (1989), p. 154).

"There is no obstacle to full employment whenever Say's law prevails."

(Morishima (1989), p. 151). "Ricardo assumed Say's law in the machinery

chapter of the third edition as well as in all the other chapters."

(Morishima (1989), pp. 169 - 170). "Ricardo mistakenly concluded that mechanization in one of the sectors would give rise to the unemployment of labour, because he forgot that Say's law prevails in his economy." (Morishima (1989), pp. 179 - 180).

Morishima is certainly right to say that Ricardo assumed Say's law in the machinery chapter, since, as we saw, the aggregate investment I is identically equalized to the aggregate saving S, though the composition of the gross investment (i.e., the reproduction of fixed and circulating capitals) is considered to change. If $I \equiv S$, then, there always exists a sufficient demand for aggregate commodities produced Y($\equiv C + S$), since $Y \equiv C + I$. This is exactly the point by which Ricardo distinguished himself from Malthus. "Malthus' objection to machinery is that it adds so much to the gross produce of the country that commodities produced cannot be consumed -- that there is no demand for them: mine, on the contrary, is that the use of machinery often diminishes the quantity of gross produce." (Ricardo (1952), p. 387).

If there always is sufficient demand for commodities, then, why is the demand for labor reduced? It is because the demand for commodities is not demand for labor (Mill (1909), pp. 79, 96 - 97) in the classical economics in general, and, of course, in Ricardo's economics. Demand for labor is determined by the wages fund, which is reproduced by the gross produce. It is reduced, then, if the use of machinery diminishes the quantity of gross produce. Demand and supply are equalized for commodities produced, but there exists an excess supply for of labor and there exists an excess demand for wage goods. The existence of an excess supply for one thing and an excess demand for another is not inconsistent with Say's law, since it merely implies that demand and

supply are equalized for commodities produced, or that an excess supply
cannot exist for every thing.

Unemployment in Ricardo's machinery chapter is, therefore, not due
to an insufficient demand for commodities produced, but due to a shortage
of the supply capital. Wages fund (circulating capital) is not enough
to support all the labor. Nor is it necessary to employ all the laborers,
since machinery (fixed capital) introduced requires few laborers to be
operated. As a matter of fact, Morishima clearly recognized the existence
of Marxian unemployment due to a deficiency in capital, along with
Keynesian unemployment due to a deficiency in effective demand, in his
The Economics of Industrial Society (Morishima (1984), pp. 195, 197).
In his Ricardo's Economics, however, Morishima assumed it away before he
begins the discussion of machinery problem. "The thesis claiming that
full employment would prevail under Say's law tacitly assumes that the
economy is provided with an amount of capital which is enough to employ
the whole of the labourforce." (Morishima (1989), pp. 153 - 154).
This assumption is fatal to the discussion of Ricardo's machinery problem,
in view of the fact that Ricardo is recognized by Marx as his predecessor
in the theory of unemployment (reserve army of labor). "It is one of
the greatest merits of Ricardo to have seen in machinery not only the
means of producing commodities, but of creating a 'redundant population'."
(Marx (1954), p. 384).[7]

Footnotes

1) See Barton (1934) and Ricardo (1951), pp. 386 – 397.

2) See, for example, Blaug (1958), pp. 64 – 79, Davis (1989), Hollander (1979), pp. 346 – 375, Marx (1968), pp. 550 – 581, and Mazane (1959).

3) See Hicks (1977), p. 185. These cases may include, not only that of the Industrial Revolution in England, but also those of some socialist countries.

4) If the rate of profit rises, which is very likely, the non-wage good industry must be expanded and there should be a further reduction in the demand for labor.

5) This is, of course, because the fixed capital is assumed not to depreciate.

6) This was already pointed out by Shibata in his criticism of Mangoldt. See Shibata (1935), p. 317.

7) See also Mazane (1959), pp. 17 – 18, 146.

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