ELEMENTS FOR A COHERENT THEORY OF RENT

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Abstract: The question of rent in economic theory is rather complicated, even at the level of its definition. This article attempts to get back to basics in order to clear things up and present a complete and correct theory of rent. Starting with the classical definition of rent, as an income earned by the owner of non-produced inputs, it clarifies first the definitions of the different kinds of rent: differential rent, absolute rent. It then uses a step-by-step approach to show the effect of these various kinds of rents on a price system. The article also addresses the issue of type II differential rent, corresponding to the use of different techniques with a homogeneous input. This helps to explain the effect of rent on the distribution of the product. The question of urban land rent is also clarified: it is shown that it obeys mechanisms that are clearly different from those governing agricultural land rent.

Keywords: rent; differential rent; absolute rent; price system; income distribution

Introduction

The Debate on Rent

In a 2014 article, "Land Rent Theory Revisited," Joon Park reviewed many articles on rent over the previous 25 years. Among them the articles of Anne Haila, "The Theory of Land Rent at the Crossroads" (Haila 1990) and Derek Kerr "The Theory of Rent: From Crossroads to the Magic Roundabout" (Kerr 1996) were particularly noteworthy. But Park concluded that "the development of Marxian rent theory has stagnated since the 1990s. A few fundamental problems in the theory were

revealed during the period of heated debates." He considered that "the revival of the theory is urgently required as a convincing alternative in the understanding of housing markets" (Park 2014, 88). Indeed, a long debate focused mainly on urban land rent has opposed Marxist and neo-classical interpretations, but this debate about the nature and determination of rent has remained somewhat inconclusive. This justifies re-examining the question with a fresh look. But let us first characterize both views.

Starting with the Marxist theory of rent, it is based on the labour theory of value, which considers that labour is the only factor of production. Thus, rent is an income deriving not from the productivity of land—or other unproduced commodities, but from its ownership, with rent having the same nature as profit as a part of surplus-value. In this conception, rent has therefore an institutional nature. Indeed, what is transferred to the farmer by the landlord, against the money payment of rent, are two elements of the property right, i.e. the right to use the land and the right to keep what is produced when using it. Thus, rent is not supposed to reward the contribution of land to production or its "fertility," because the transfer corresponding to the payment of rent per se does not create any surplus. The product, such as wheat, for instance, obtained by cultivating a piece of land has no reason to change because it is rented, and the monetary income earned by a landlord renting a piece of land is simultaneously lost by the farmer who pays this rent. It follows that rent by itself does not create any value at the macroeconomic level.

As for the land itself, the fact that it is not produced implies *ipso facto* that it cannot have any labour-value or cost of production, and puts it in the same category as all these goods which already exist at the beginning of a period because they were produced during a previous period. They are in fact like second-hand goods: exchanging them or renting them does not add any value to the overall product of a period. The use of such a good is simply transferred from the seller to the buyer, and pre-existing money income is transferred from the buyer to the seller. It is the reason why rent, deriving from property and not from production, can be considered as a transfer income, being a monetary form of surplus-value, like profit. From this point of view the words "surplus-value" have not been well chosen by Marx, surplus-value being in fact, not an addition, but a levy made on the total value of the product.

As for the neo-classical view, it considers that rent is a return to land as a fixed factor of production, and that the unusual feature of land is that its quantity is fixed and completely unresponsive to price. Thus, as pointed out by Samuelson and Nordhaus in the 19th edition of their textbook *Economics*: "because the supply of land is inelastic, land will always work for whatever it can earn. Thus, the value of the land derives entirely from the value of the product, and not vice versa" (Samuelson and Nordhaus 2010, 210). Indeed, since land is unproduced, it cannot

have a production cost, and a supply curve either. It also derives from this fact that on a supply and demand diagram the supply curve is replaced by a purely vertical line corresponding to the fixed quantity of land available, and the price of land is thus set by the demand curve alone, knowing that the demand of land is not a direct but a derived demand. The price which is thus determined is the price of land itself, and the amount of rent is determined indirectly by difference with the cost of bringing land to the market. In this conception rent has therefore a micro-economic nature, and is comparable to monopoly rents, which are earned by firms that are able to restrict supply and/or increase prices without fear of attracting competitors.

Regarding now the present article, whereas its background is essentially a classical and Marxist one, it is not without a certain number of critiques to the Marxist theory. Moreover, at the end of the article we will show that the microeconomic neo-classical view may shed light on some features of rent as regards specifically the determination of urban land rent, which is in any case very different from rent on agricultural land. This implies to now provide a more rigorous definition of rent.

A General Definition of Rent

To begin with, let us start with a general definition of rent. In this article, we will use the term with the meaning that it generally has in classical economics, where rent is the income received by the owner of non-produced inputs, such as land, to compensate for his participation in the production process. As such economic rent is opposed to normal profit. It is a similar definition that is used in Sraffa's theory of production prices, where rent appears in chapter XI, § 85:

> Natural resources which are used in production, such as land and mineral deposits, and which being in short supply enable their owners to obtain a rent, can be said to occupy among means of production a position equivalent to that of "non-basics" among products. Being employed in production, but not themselves produced, they are the converse of commodities which, although produced, are not used in production. (Sraffa 1960, 88)

It must be underlined that land for Sraffa is clearly agricultural land, used in the production of agricultural products, such as corn, which appears in his example. Land is never urban land, which is also often referred to as urban ground. This question of urban land rent will be addressed in the penultimate section of this article.

It is, however, necessary to recall here, as we demonstrated in a former publication (Flamant 2015), that rent is one of the weak points in Sraffa's theory (the other one being the introduction of fixed capital and joint production). Indeed, and to make it short, the price system in Sraffa's (1960) work must not have more

equations than prices. This implies to eliminate rent from the equations giving the price of commodities produced with the use of natural resources. For each of these commodities, the only equation to appear in the system must therefore be the equation giving its price when the natural resource involved pays no rent (for example, the no-rent land). Then another system of n equations, for the same commodity but for n qualities of land, will determine the various levels of rent—which are the variables to be determined, corresponding to these n qualities. But the intractable problem is that to write these last equations you need to determine first the no-rent natural resource, which implies that the system of prices must be known. And for this general system of prices for n commodities to be known, we need to know first which one is the no-rent resource. This is circular reasoning from which we cannot escape, and which invalidates, among other problems, Sraffa's theory of production prices.

In passing, as long as we consider that the simultaneous determination of all prices is a macroeconomic problem, this shows that the determination of rent itself cannot be considered as a macroeconomic problem, because the determination of rent clearly depends on the prior determination of the whole price system. Thus, we come to the conclusion that the determination of rent is a purely microeconomic problem: the price system does not depend on rent, which is not a primary element of prices, but the level of rent depends precisely on the price of the commodities produced with natural resources. However, and for the reasons explained in the preceding paragraph, this determination of the price system cannot be realized within the framework of Sraffa's theory of production prices. We will show below in the section "A General System of Values and Prices" that a correct approach to the price system can be made within another conceptual framework, where prices are money prices.

Going Further on Rent and Ownership

Let us begin by stating again that rent is supposed to be an income corresponding to the "contribution to production" of the non-produced means of production, such as land, and that this definition includes other unproduced natural resources such as mines, or more precisely mineral deposits. The essential difference with fixed capital as a means of production is the unproduced character of these resources, which implies that it is impossible to calculate for them a cost of production, as it is the case for machines. Another difference is that land is supposed to be immutable, and therefore has an infinite life span. But this difference does not apply to mines, which all end up being exhausted.

In Sraffa's (1960) book, there is an analogy between these unproduced means of production, such as land, on the one hand, and fixed capital, on the other hand, which consists in their presence on the left side of the equations defining the prices of

production. But, unlike fixed capital, their absence on the right side of the system of equations does not, however, permit them to be included in the net standard product or in the composition of the standard commodity. This also explains why their price is calculated differently: fixed capital may appear among final goods on the right side of the equations defining prices, whereas land does not appear there, and its price is determined thereby from the rent it provides. Moreover, and taking land as the example of non-produced commodities, it is clear that there is no consumption of land in the production process, and therefore it is out of the question to treat it as an intermediate good, through any depreciation, which is not conceivable.

Finally, as we already said, the price system is calculated by retaining, for each product for which land is used, the only equation in which rent is zero, and where therefore land does not appear even on the left side of the equations. As we also explained, rent remains for this reason the stumbling-block of Sraffa's price system, as well as fixed capital—for other reasons, since the "fertility" of land varies with distribution and the price system: this makes it impossible to determine which land is the land without rent without knowing first the price system! Once again, a theory is invalidated by the circularity of its reasoning.

These different characteristics of land justify Marx (1894) when he points out in Vol. III of *Capital*, Part 6, Chapters 37 through 47 that, as for fixed capital, the remuneration of land exists only because of its appropriation and more precisely because of the private property of land. This explains why in the real-world rent is not zero even on the marginal land, where the cost of production is the highest, but where there is nevertheless a positive rent. This is what Marx calls absolute rent. If it did not exist, the landlord owning this marginal land would have no interest in renting it for cultivation. One could argue that this is due to the scarcity of land, and that if there is free land then the marginal rent must be zero. But this objection is based on confusion over the meaning of the word "free," which not only means "not cultivated" but moreover "not the object of appropriation." It does not take into account that precisely in the capitalist mode of production there is no free land, in the sense of land without owners. One cannot, therefore, cultivate even a "free" land, but this time in the sense of a land "not cultivated so far," and thus a land such as scarcity could not manifest itself, unless rent is paid to its owner. This means that agricultural rent has nothing to do with scarcity as such.

Another proof of the fact that rents remunerate the ownership of unproduced means of production, and not their "productivity," comes from the fact that land, like fixed capital, does not create value: it transmits no value to the product. If land transmitted value, it is difficult to see why the marginal land would not transmit it, especially because, with the extension of cultivated areas, a marginal land at a given moment ceases necessarily to be a marginal one later. In fact, like fixed capital, land is a catalyst, and in this case it is the support or rather the substratum

of the production process for agricultural products. This support can even be dispensed with in the case of so-called landless production, like hydroponic production, realized without any land. It follows that rent, as a remuneration for the ownership of land, is just like profits also taken from surplus-value, and consequently follows identical mechanisms.

Outline of the Article

The aim of this article, starting on the same initial definition, is therefore to explain in a non-contradictory or non-circular way the nature and theoretical determination of rent, in order to present a coherent theory of rent. Since rent must be explained through its interaction with the price system, the second section, after the first one, which is this introduction, is devoted to briefly outlining a general system of values and prices. The third section starts by recalling that there are two kinds of rent: differential rent and absolute rent. To illustrate how rent is determined, it exposes four different systems of prices for the same commodity (wheat), produced on lands of different "fertilities." The first system is characterized by zero global rent, the second one by zero total rent and equalization of prices by the state, the third one by a zero-differential rent on marginal land, and the fourth one by a zero-differential rent and a positive absolute rent on marginal land. The fourth section can thus analyze type II differential rent for Sraffa and Marx, i.e. the case of the production of wheat with different techniques on homogeneous land. All this allows in a fifth section to understand better the effect of rent on the price system and distribution. The sixth section is devoted to the issue of urban land rent, before a conclusion that summarizes the lessons learned.

A General System of Values and Prices

General Considerations on Values and Prices

As we shall now show, there is no need for the introduction of rent to run up against the difficulties encountered in Sraffa's system: it is not necessary to know first the land without rent, in order to determine only after that—and simultaneously, distribution and prices. We will briefly expose a general system of determination of values and prices.

As indicated above, the Marxist background of this article means that as far as values are concerned it relies on the Marxist labour theory of value. This means that the value of a commodity is defined as the average social labour-time, directly and indirectly, spent to produce it. This implies that the standard of value is labour-time and that values have *ipso facto* the dimension of time (with the meaning that the word "dimension" has in physics). But this also implies that Marxist theory is not compatible with Sraffa's theory of production prices, because the standard of prices

in this last theory is a standard commodity made of a basket of basic commodities as defined by Sraffa, i.e. commodities that enter, directly or indirectly, into the production of all commodities. Since there is no possibility to link both standards, and therefore to go from one system to another, this implies that Marxist values cannot be transformed into Sraffa's production prices, and reciprocally.

However, and although the labour theory of value stays in the background, it does not have exactly the same significance as it had for Marx, for reasons that I developed in my book *Main Concepts and Principles of Political Economy: Production and Values, Distribution and Prices, Reproduction and Profits: Prelude to a Reconstruction of Economic Theory* published in three electronic data bases (Flamant 2018, 2). To summarize this conception, let us underline that Marx, like Ricardo, wants to define what makes the equivalence of commodities based on the postulate that commodities are equivalent on the occasion of their exchange, value being what explains the exchange ratio between two commodities, because this exchange ratio is an equivalence relation.

But this approach is flawed for three reasons: 1) commodities do not exchange against commodities, because in the real-world exchanges are not barter exchanges between commodities but are exchanges between commodities that already have a monetary price and money; 2) in the real-world money itself is not a commodity, like it is for Marx or neo-classical economists, but a general equivalent created by banks and the central bank, and represented by pure numbers which have no dimension and thus are scalars, as well shown by modern monetary theory (MMT); 3) as soon as an average rate of profits comes into the picture, with different organic compositions of capital for different commodities, exchange ratios do not correspond anyway to the ratio of labour values, and commodities do not exchange at their value, a problem that Ricardo failed to solve and that Marx tried to solve by the transformation of values into prices, but without succeeding in this endeavour.

The System of Values

Contrarily to Marx, I have demonstrated in my book (Flamant 2018) that the equivalence of commodities which gives them their value cannot be defined at the level of exchange, but at the level of production, as the quantity of labour-time, directly and indirectly, spent to produce a commodity. The standard of these pure labour values is therefore a quantity of time, with the dimension of time. Once commodities have been produced, and in order to be exchanged at a monetary price against money, their values must be transformed first into money values, and this transformation can be made simply, just by multiplying the various labour-times by the corresponding money wages. This can be made because wages are the only economic variable that has two dimensions, since it is defined by a given number of scalar units of money per a given quantity of labour-time. At the same time this procedure, based on

existing social salary scales, homogenizes the various labour-times and reduces complex labour into simple labour or average social labour. This allows determining easily what can be called the money values of all commodities.

On this basis, we can now start with the calculation of labour values, using a method quite similar to one of the two methods exposed by Morishima in his book *Marx's Economics: A Dual Theory of Value and Growth* (Morishima 1973, 10–11).

Let us assume that there are k commodities, and that they are intermediate commodities. We define the value v_j of one unit of commodity j as the overall labour-time it takes to produce commodity j. This labour-time is defined as average social labour-time, which means that it is weighted by the amount of wages paid for each type of labour.

Since commodity j has been produced through the transformation of various other intermediate commodities, v_j can be defined first as the sum of the direct labour-time l_j needed to produce commodity j, plus the indirect time corresponding to the value of the commodities that have been transformed to produce commodity j, which is the value of its means of production, i.e. the intermediate commodities i used in its production.

Let us define a_{ij} as the share of total production or output of branch i used as an input in the production of commodity j by branch j. These a_{ij} coefficients are therefore pure scalars. Thus we can write:

$$v_j = a_{1j}v_1 + a_{2j}v_2 + ... + a_{jj}v_j + ... + a_{kj}v_k + l_j \tag{1}$$

Or

$$v_j = \sum_i^n a_{ij}v_j + l_j \tag{2}$$

To represent the whole system of values in matrix format, we call V the column vector whose elements v_j are the values of intermediate commodities:

$$V = v_1, v_2, ..., v_j, ..., v_k$$

We call A a square matrix of dimension k, whose elements a_{ij} reflect the fact that the k intermediate goods enter collectively in their own production: they are primary commodities or commodities entering directly or indirectly in their production.

We call L the column vector whose elements l_j are the quantities of direct labour-time.

Then we can write in matrix notation:

$$V = L + AV \tag{3}$$

That gives us:

$$V = \left(I - A\right)^{-1} L \tag{4}$$

On this basis, we can calculate the labour-value of a commodity produced with the use of land. Let us call it wheat, its value being v_w, and assume that wheat is an intermediate commodity. Its value can be calculated in the same way as any other commodity, using a simplified system where there are only single-product industries and circulating capital, and it is not affected by rent, which comes into play only at the price level.

With A_w a row vector such as $A_w = a_{1w}, a_{2w}, ..., a_{iw}, ..., a_{kw}$ and V the vector of values,

$$v_w = A_w V + l_w \tag{5}$$

As for the money values of commodities, which we can call v_j^m for commodity j, it is easy to obtain them by multiplying the values v_j by $\overline{w}$, or the average money wage:

$$v_j^m = \overline{w} * v_j \tag{6}$$

The Price System

To transform these money values, deriving from the money payment of wages, into money prices, one has to bring profits into the picture, which can be done by adding to these money values a mark-up, which corresponds for a particular branch producing a given commodity to a margin rate over the direct production cost, made of wages and the total price of intermediate commodities. The amount of this mark-up is proportional to the capital employed in the production of each commodity, and its ratio over the price of fixed capital corresponds to the rate of profit, either in a particular branch or in the whole production system. These mark-ups therefore vary from one branch to another, and they are given.

As far as prices are concerned, and to simplify the calculations, let us continue to assume that all k commodities are intermediate commodities. Let us define the price p_j of one unit of commodity j as the sum of wages paid in branch j producing commodity j plus the price of all the inputs used in the production of commodity j, to which must be added an amount of profit calculated as a mark-up over this sum, most often called margin rate. Prices are therefore money prices, defined as an amount of money, which will allow for exchanges of commodities against money to take place. They are thus fundamentally different from production prices in Sraffa's system.

Let us define a_{ij} as the share of total production or output of branch i used as an input in the production of commodity j by branch j. These a_{ij} are therefore scalars, and given technical data. Let us call l_j the quantity of direct labour-time in branch j, $\overline{w}$ the average nominal wage taken as the wage unit $(\overline{w}=1)$, and m_j the average margin rate for branch j producing commodity j, which are also given data. We can thus define a price p_j as:

$$p_j = \left[\bar{w} l_j + \sum_{i=1}^{k} a_{ij} p_i \right] \left(1 + m_j\right) \tag{7}$$

On this basis, we can define a row vector A_j, such as:

$$A_j = a_{1j}, a_{2j}, ..., a_{jj}, ..., a_{kj}$$

We can also define a column vector *P*, such as:

$$P = p_1, p_2, ..., p_j, ..., p_k$$

And finally, a column vector: $L = l_1, l_2, ..., l_j, ..., l_k$

We can now represent the whole price system in matrix format, naming *A* the square matrix of a_{ij} coefficients and of dimension *k*, with *I* as the unit diagonal matrix and *M* as the diagonal matrix of the margin rates $m_1, m_2, ..., m_j, ..., m_k$ in all of the *k* branches. Then we can write:

$$P = \left(I + M\right)\left[\bar{w}L + AP\right] \tag{8}$$

Taking $m_j^* = 1 + m_j \Rightarrow M^* = I + M$, this last equation can be simplified as:

$$P = M^*\left[\bar{w}L + AP\right] \Rightarrow P = M^*\bar{w}L + M^*AP \tag{9}$$

If we now pre-multiply both terms of this last equation by the inverse matrix M^{*-1}, this gives us the following equation:

$$M^{*-1}P = \bar{w}L + AP \Rightarrow \left(M^{*-1} - A\right)P = \bar{w}L \tag{10}$$

So that we finally get:

$$P = \left(M^{*-1} - A\right)^{-1} \bar{w}L \tag{11}$$

The whole price system is therefore determined as the result of this last equation.

In passing, in his 1977 book *Marx after Sraffa*, based on Sraffa's theory, Steedman argued that the rate of profit, the prices of production and thus the share of the product going to labour can all be determined without any reference to value magnitudes (Steedman 1977). But the fact is that Sraffa's theory is flawed, because it is a circular one, that true prices are not relative prices expressed in a standard commodity, but monetary prices, and that true wages are not real wages, but monetary wages. All this invalidates Steedman claims. Similarly, the fact that values and Sraffa's production prices belong to two different fields of measurement, with two distinct standards which cannot be linked (time for values and a standard net product for prices), totally invalidates Samuelson's developments about inverse transformation (Samuelson 1971).

Introduction of Rent into the Price System: Differential Rent and Absolute Rent

To introduce rent into our system, we just need to start by assuming that there is only one commodity, e.g. wheat, produced with lands of different "fertility," and with different quantities and proportions of circulating capital on each of these lands, considering at first that there is no rent. In order to introduce rent, we will proceed in stages, which will be done by assuming that there are always *n* kinds of lands of different "fertility," all producing wheat with different production processes, and by examining successively four systems of equations in which rent exists but manifests itself in different ways.

The Price of Wheat with a Zero Total Rent

We know that if values and prices are determined through systems of equations there can be only one single value and one single price for the same commodity, whatever the conditions of production. There can be only one equation giving the value of wheat; otherwise, the system would be overdetermined. But this equation cannot in any case be the equation giving the conditions of production on the marginal land. This is true for the calculation of values, because it is the totality of the labour expended to produce wheat that must be taken into account, and not only that expended on the marginal land, all the more so that it is not known, since its determination depends on the price system. This is true also for the calculation of prices, because otherwise one would fall back into a circular reasoning: the system of equations allowing the calculation of prices assumes that the land without rent is known, but in order to know what this land without rent is, one must know the price system!

Similarly, assuming that wheat is an intermediate commodity, its price can be calculated using the same type of equation as just presented above. The equation giving the price of wheat, i.e. p_w, must necessarily take into account all the intermediate commodities and labour inputs used on all the lands simultaneously under cultivation to produce the total quantity of wheat.

With $\overline{w}$ the average nominal wage, taken as the wage unit $\left(\overline{w}=1\right)$, l_w as the given quantity of average social labour, which is used directly in the production of wheat, and m_w the average margin rate for the whole wheat-producing branch, we can write:

$$p_w = \left[\overline{w}l_w + \sum_{i=1}^{i=k} a_{iw}p_i\right]\left(1+m_w\right) \tag{12}$$

With P the vector of prices and A_w a row vector such as $A_w = a_{1w}, a_{2w}, ..., a_{jw}, ..., a_{kw}$, we can write in matrix format the equation giving the price of wheat as:

$$p_w = \left[\overline{w}l_w + A_wP\right]\left(1+m_w\right) \tag{13}$$

It must be emphasized that this price of wheat is necessarily an average price, like all other prices p_j. It should be kept in mind that each equation of the price system does not reflect the conditions of production of a given firm, but those of a whole branch, consequently composed of all enterprises producing together the total quantity of each commodity, each with its own production methods and techniques, which have no reason to be the same as those of all the other firms producing the same commodity.

At the enterprise level, firms therefore have different conditions of production, which means that they do not realize the average rate of profit, but a specific rate of profit, which may be higher or lower than the average rate of profit. In the case of commodities for which land is used as a means of production, the difference in production conditions and therefore in production costs may originate first from the heterogeneity of land, which for the same area, with the same amounts of circulating capital and labour, and with a given margin rate, produce different quantities, and therefore have a different yield and "fertility." This is even truer if the amounts of circulating capital and labour differ, as is generally the case.

For a given average price of wheat p_w and average profit rate r_w, the most "fertile" land with the lowest production cost will thus benefit from a rent corresponding to what Marx calls a differential rent of type I. But there is also a situation where production conditions may differ and the cost may be higher or lower per unit of quantity produced due to the use of different production techniques on a homogeneous land. This will make appear—for the firms with the lowest cost of production on the same land, what Marx considers to be also a rent, which he calls differential rent of type II, which will be dealt with in the next section.

The first phenomenon can be translated into equations because, once prices are known, including the average unit price of wheat p_w and the margin rates m_w^1 through m_w^n, which make it possible to obtain the average rate of profit in the branch producing wheat, the unique equation giving the average price of wheat within the price system can be disaggregated, making land appear, and thus for this wheat-producing branch only we can write as many equations as there are lands of different "fertility," so that we have, for n lands of distinct "fertility":

$$\left[\bar{w}l_w^1 + A_w^1 P\right]\left(1+m_w^1\right) + \rho_1\Lambda_1 = p_w$$
$$\left[\bar{w}l_w^2 + A_w^2 P\right]\left(1+m_w^2\right) + \rho_2\Lambda_2 = p_w$$
$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$
$$\left[\bar{w}l_w^g + A_w^g P\right]\left(1+m_w^g\right) + \rho_g\Lambda_g = p_w \quad \text{with } \rho_g = 0 \qquad \text{(System 1)}$$
$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$
$$\left[\bar{w}l_w^{n-1} + A_w^{n-1} P\right]\left(1+m_w^{n-1}\right) + \rho_{n-1}\Lambda_{n-1} = p_w$$
$$\left[\bar{w}l_w^n + A_w^n P\right]\left(1+m_w^n\right) + \rho_n\Lambda_n = p_w$$

In this system A_w^i and P are known vectors, Λ_i are the quantities of land of different fertility in units of area (hectare for example), and ρ_i is the rent per unit of area. It should be emphasized that the system has been standardized to show only the unit prices, so that the distinct quantities Λ_i are the inverse of the physical return of the land concerned: this is the required land area in order to produce a unit quantity of wheat, which therefore varies from one land to another according to its "fertility."

This system of equations is interesting, first of all because it makes it possible to calculate without difficulty the amount of the different rents ρ_i, all the other variables being known. It is interesting also because total rent is necessarily nil (it is recalled that the absence of rent was a necessary condition for calculating prices, which are average prices). This implies that the following equation is always satisfied:

$$\sum \rho_i \Lambda_i = 0$$

But it immediately follows that there are lands where rents are necessarily negative, and that this is the *sine qua non* condition for the simultaneous existence of positive rents, since the sum of the two kinds of rents must necessarily cancel each other out. Thus, land can be ranked according to the level of its rent, ranging from the one where the positive rent is the highest, noted ρ_1, to that where the rent is the most negative, noted ρ_n, through a land where the rent is null, for instance, for $i = g$ (with consequently $\rho_g = 0$). We have $\underset{i=1}{\overset{i=g}{\rho_i}} \geq 0$, and we also necessarily have $\underset{i=g+1}{\overset{i=n}{\rho_i}} < 0$: the sum of the positive rents is equal to the sum of the negative rents. It should be emphasized that the order of land fertility is deduced from the order of rents, but that the land marked Λ_1 is not necessarily the one where the physical yield (in quantity of wheat per hectare) is the highest. In other words, Λ_1 is not necessarily the smallest area, and the property $\Lambda_1 < \Lambda_2 < ... < \Lambda_g < ... < \Lambda_{n-1} < \Lambda_n$ is not necessarily verified. This is because in each equation we also find the expressions $\left[\bar{w} l_w^i + A_w^i P\right]\left(1 + m_w^i\right)$, which may vary with distribution and the quantities of labour and inputs used on each land. In other words, the land with the highest physical return is not necessarily the land with the highest rent if it requires more inputs than another one with a lower physical return.

One might think that such a system is absurd because it is devoid of all reality: it is hard to see how landlords could accept to pay a negative rent in order to rent their land! But we will show through two additional and different examples that this system is not absurd in all cases, because everything depends on the nature of land ownership.

The first example corresponds to the case where all of the capitalist enterprises of the branch (the "farmers") have redeemed the land they exploit to the landowners and sell all their wheat at the price p_w. In this case, everything happens as if the

best performing firms in the sector had a higher rate of profit than the average rate of profit, and thus realized an over-profit, and as if the least performing firms, with higher production costs, obtained a lower rate of profit than the average rate of profit, realized by the average "farmer" or firm for which the rent is zero. In fact, we are in a situation where there is no rent, strictly speaking, but because there are no "pure" landowners. The system, however, can work, since all firms nevertheless make a profit (otherwise they would not exist), and because those whose profits are reduced (through negative rents) by the lesser "fertility" of the lands that they own necessarily bought these lands at prices lower than those of other lands of greater "fertility." The reverse is also true: super-profits offset the higher prices paid for the purchase of these other lands.

The Price of Wheat with a Zero Total Rent and Equalization by the State

This situation corresponds to a second example, in which all lands are nationalized, and consequently owned by the state, which leases them to "farmers," or capitalist enterprises which use them for the production of wheat. Assuming that the state wishes to maintain the price of wheat at the p_w level corresponding to the average cost of production, it is sufficient for this purpose, first, to forego the benefit of an overall net income for the lands it owns, and then to put in place an equalization scheme. In this case, the state will tax all the companies for which the rent is positive (which make an additional profit over the average profit rate), and pay a subsidy to all the companies for which the rent is negative, taxes ($-\rho_1,\ldots,-\rho_{g-1}$) and subsidies ($+\rho_{g+1},\ldots,+\rho_n$) being equal and opposite to the amount of each rent (the amounts are seen from the point of view of firms, which explains the minus sign). The total amount of taxes is equal to the total amount of subsidies. The net cost to the state is therefore nil, but although it is the owner of the land, it pays globally nothing to itself. The system of equations then becomes, with $\sum_{i=1}^{g-1} \rho_i > 0$, $\sum_{i=g+1}^{i=n} \rho_i < 0$, and $\rho_g = 0$:

$$
\begin{aligned}
&\left[\bar{w}l_w^1 + A_w^1 P\right]\left(1+m_w^1\right) + \left(\rho_1 - \rho_1\right)\Lambda_1 + \rho_1\Lambda_1 = p_w \\
&\left[\bar{w}l_w^2 + A_w^2 P\right]\left(1+m_w^2\right) + \left(\rho_2 - \rho_2\right)\Lambda_2 + \rho_2\Lambda_2 = p_w \\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\
&\left[\bar{w}l_w^g + A_w^g P\right]\left(1+m_w^g\right) + \left(\rho_g - \rho_g\right)\Lambda_g + \rho_g\Lambda_g = p_w \qquad \text{(System 2)} \\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\
&\left[\bar{w}l_w^{n-1} + A_w^{n-1} P\right]\left(1+m_w^{n-1}\right) + \left(\rho_{n-1} - \rho_{n-1}\right)\Lambda_{n-1} + \rho_{n-1}\Lambda_{n-1} = p_w \\
&\left[\bar{w}l_w^n + A_w^n P\right]\left(1+m_w^n\right) + \left(\rho_n - \rho_n\right)\Lambda_n + \rho_n\Lambda_n = p_w
\end{aligned}
$$

It can be seen that for each category of land the tax or subsidy cancels the amount of rent, this amount being positive when $\sum_{i=1}^{g-1} \rho_i > 0$, or negative when $\sum_{i=g+1}^{i=n} \rho_i < 0$. Rent is therefore no longer an element of price p_w, while these taxes and subsidies create a corresponding positive or negative income for the state, noted in bold characters ($\rho_1\Lambda_1$, $\rho_2\Lambda_2$,..., $\rho_g\Lambda_g$,..., $\rho_{n-1}\Lambda_{n-1}$, $\rho_n\Lambda_n$), which replaces rent as an element of the price, knowing that both global rent and global state income are zero. Therefore, the price of wheat p_w remains unchanged. Equalization has resulted in a mere transfer of positive or negative incomes from enterprises, for which there is no longer any rent, to the state, whose total income is zero, as is total rent. Thus, all firms are equal as regards the rate of profit that they can realize.

These two examples where the price of wheat remains the average price p_w and where global rent is nil clearly show that the previous system is not absurd and can exist under certain conditions. Moreover, there are cases where equalization schemes of this type can be managed by firms themselves, without necessarily involving the state through taxes and subsidies.

The Price of Wheat with a Zero-Differential Rent on Marginal Land

In the real world, if the state is not the owner of any land, then lands are the property of landowners who lease them to capitalist enterprises. It is clear, first of all, that there can be no negative rent for any landowner because it would mean that they would have to pay for their land to be used! This implies, first of all, that price p_w is fixed at a higher level p'_w which totally suppresses the negative rents that appeared in the previous price system, instead of letting these rents appear on the least fertile lands before being compensated by the state.

This price p'_w must be such that it cancels the highest negative rent ρ_n on the least fertile land, noted Λ_n. This implies that the price p_w should be increased by an amount $-\rho_n\Lambda_n$, equivalent to its absolute value $|\rho_n|\Lambda_n$, in order to cancel the negative rent on the marginal land. Since the price of wheat is the same regardless of the category of land, this increase must apply to all lands. The price system must therefore become:

$$
\begin{aligned}
&\left[\bar{w}l_w^1 + A_w^1 P\right]\left(1+m_w^1\right) + \rho_1\Lambda_1 + |\rho_n|\Lambda_n = p'_w \\
&\left[\bar{w}l_w^2 + A_w^2 P\right]\left(1+m_w^2\right) + \rho_2\Lambda_2 + |\rho_n|\Lambda_n = p'_w \\
&\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\
&\left[\bar{w}l_w^g + A_w^g P\right]\left(1+m_w^g\right) + \rho_g\Lambda_g + |\rho_n|\Lambda_n = p'_w \qquad \text{(System 3)} \\
&\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\
&\left[\bar{w}l_w^{n-1} + A_w^{n-1} P\right]\left(1+m_w^{n-1}\right) + \rho_{n-1}\Lambda_{n-1} + |\rho_n|\Lambda_n = p'_w \\
&\left[\bar{w}l_w^n + A_w^n P\right]\left(1+m_w^n\right) + \left(\rho_n - \rho_n\right)\Lambda_n = p'_w
\end{aligned}
$$

The last equation of this system can thus be written:

$$\left[\bar{w}l_w^n + A_w^n P\right]\left(1+m_w^n\right)+0=p_w^{'}$$

Thus $p_w^{'}=p_w+\rho_i\Lambda_i+|\,\rho_n\,|\,\Lambda_n$ (we recall that $\sum_{i=1}^{g-1}\rho_i>0$ and $\sum_{i=g+1}^{i=n}\rho_i<0$ with $\rho_g=0$). For the marginal land Λ_n at the price level $p_w^{'}$, with $p_w^{'}=p_w+|\,\rho_n\,|\,\Lambda_n$ differential rent is therefore nil. We recall again that ρ_n is indeed negative (see System 1 above). On the other hand, with this price level $p_w^{'}$ higher than the average price level p_w by an amount $|\rho_n|\Lambda_n$ (the opposite or absolute value of the negative rent ρ_n on the marginal land), firms using land Λ_{n-1} will pay a rent equal to $\rho_{n-1}\,\Lambda_{n-1}+|\rho_n|\Lambda_n$ to the landlord, and so on: firms using land Λ_1 will pay rent of $\rho_1\,\Lambda_1+|\rho_n|\Lambda_n$.

The Price of Wheat with a Zero-Differential Rent and a Positive Absolute Rent on Marginal Land

The fact that the rent on the least fertile land is zero in price System 3 shows, however, that this case does not yet correspond to a situation where land is appropriated by landowners, which implies that the owner of the least fertile land would refuse to provide it to a farmer for free and therefore without any rent. The landowner in question must therefore receive a rent, which corresponds to what Marx calls the absolute rent. Let us call ρ_a the level of this rent per area unit. This rent can be collected only if it is passed on in price, and since there is only one price of wheat, therefore all the landowners will benefit from this rent, at the same level for all. The price system then becomes:

$$p_w^{''}=p_w^{'}+|\,\rho_a\,|\,\Lambda_i,\ \text{with}\ \rho_g=0;\ \rho_a>0\ \text{and}\ \rho_n<0$$

$$\begin{aligned}
&\left[\bar{w}l_w^1 + A_w^1 P\right]\left(1+m_w^1\right)+\left(\rho_1+\rho_a\right)\Lambda_1+|\rho_n|\Lambda_n=p_w^{''}\\
&\left[\bar{w}l_w^2 + A_w^2 P\right]\left(1+m_w^2\right)+\left(\rho_2+\rho_a\right)\Lambda_2+|\rho_n|\Lambda_n=p_w^{''}\\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\\
&\left[\bar{w}l_w^g + A_w^g P\right]\left(1+m_w^g\right)+\left(\rho_g+\rho_a\right)\Lambda_g+|\rho_n|\Lambda_n=p_w^{''}\\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\\
&\left[\bar{w}l_w^{n-1} + A_w^{n-1} P\right]\left(1+m_w^{n-1}\right)+\left(\rho_{n-1}+\rho_a\right)\Lambda_{n-1}+|\rho_n|\Lambda_n=p_w^{''}\\
&\left[\bar{w}l_w^n + A_w^n P\right]\left(1+m_w^n\right)+\rho_a\Lambda_n=p_w^{''}
\end{aligned}$$

(System 4)

What lessons can be learned from this analysis? The first of these lessons is that rent and profit are revenues of the same nature: this is shown by the case in which

capitalist enterprises are themselves owners of the land they exploit, in which case the introduction of land into their means of production may leave prices and the average rate of profit unchanged and be interpreted simply as the appearance of additional differences between the actual rates of profit of the different enterprises, other than those resulting from the difference of production techniques used to produce the same good, a situation which must also be addressed.

The remaining question concerns the level of this absolute rent. How is it determined? Here we must observe that we are clearly in a microeconomic situation, because only one commodity is concerned, wheat in our example. We can see also that the only land where there is absolute rent alone, without any differential rent, is the marginal land and that the amount of absolute rent ρ_a is at this stage the same on all categories of land, for one unit quantity of wheat. This also means that the amount of absolute rent per unit area of land will be higher for all the other lands, which are more "fertile," because their yield is higher: they produce more unit quantities of wheat for the same unit area of land.

It is therefore the fixing of the price of wheat that is the fundamental element. System 4 shows that differential rent being given, absolute rent and the price of wheat are codetermined. A good example of this codetermination are the two oil shocks of 1973–1974 and 1979–1980, which abruptly established an absolute rent that was virtually non-existent before, then brought it to a very high level in relation to the cost of production. In the real world, moreover, the price of raw materials such as wheat is set according to very complex processes. In fact, for almost all raw materials there are world markets that are sensitive to the level of world supply and demand for each of them, but also to the speculation that takes place on these markets. The policy of each country in terms of customs duties may also influence prices, knowing that it can be framed by WTO regulations. Apart from these world prices, there are multilateral or national price guarantee schemes in some countries or larger areas. For instance, this has been the case for a long time with the common agricultural policy in the European Union.

Finally, at the producer's level, there is room for a negotiation with the landlord on the amount of global rent. Knowing that the amount of differential rent depends on objective elements, i.e. the relative "fertility" of the land, while the level of absolute rent on each type of land ultimately depends on the balance of power between the landlord and the farmer, the landlord always has the option of not renting and withdrawing from production. The outcome of such a negotiation will decide on the sharing between the profit of the farmer and the rent of the landlord, i.e. the level of ρ_a for a given "fertility" of land. There is room for an increase in ρ_a if the farmer accepts a reduction in his profit margin m_w^i, or a decrease in ρ_a if he has a strong bargaining power. From these findings, we can see that it is possible for ρ_a to vary from one type of land to the other, depending on the specific balance

of power in each case. This means that in the real-world different levels of ρ_a, such as $\rho_a^1, \rho_a^2, ..., \rho_a^n$, may well coexist. This happens, for instance, in the oil business when Production Sharing Agreements (PSA) organize the sharing of rent between states and oil companies.

Type II Differential Rent for Sraffa and Marx

The Case of Different Techniques on Homogeneous Land

The last example and this last remark leads us to the case of the production of wheat with different techniques on homogeneous land. This case is dealt with by Sraffa in §87 of *Production of Commodities by Means of Commodities*, and leads him to state in §88:

> While the scarcity of land thus provides the background from which rent arises, the only evidence of this scarcity to be found in the process of production is the duality of methods on lands of the same quality: if there were no scarcity, only one method, the cheapest, would be used on the land and there could be no rent. (Sraffa 1960, 91)

This remark from Sraffa is totally erroneous. Indeed, if these homogeneous lands are cultivated by one and the same capitalist enterprise (a single "farmer"), the diversity of the techniques used by this farmer does not matter. This diversity may arise from historical reasons, which can come from differences in the rhythm of the introduction of new machines: the average rate of profit of such a firm depends on the average cost of these different techniques, so that there can be only one equation for this quality of land in the price system, which remains unchanged, and the rent remains that already determined for this category of land.

It is only if several different capitalist firms are cultivating these homogeneous lands of the same fertility, and when each of them is using a different technique, that the system of equations for the corresponding lands must then be modified. Let us now suppose that these lands have the same "fertility," and that this corresponds to a land of rank Λ_f. Let us also assume that there are three firms (or farmers) rated 1, 2 and 3 which cultivate this land and use different techniques materialized by different vectors A_w^{f1}, A_w^{f2}, and A_w^{f3}, and different quantities of labour l_w^{f1}, l_w^{f2}, and l_w^{f3}. The equation hitherto unique for land Λ_f becomes:

$$\begin{aligned}
&\left[\bar{w} l_w^{f1} + A_w^{f1} P\right]\left(1 + m_w^{f1}\right) + \left(\rho_f + \rho_a\right)\Lambda_f + \left|\rho_n\right|\Lambda_n = p_w^{"} \\
&\left[\bar{w} l_w^{f2} + A_w^{f2} P\right]\left(1 + m_w^{f2}\right) + \left(\rho_f + \rho_a\right)\Lambda_2 + \left|\rho_n\right|\Lambda_n = p_w^{"} \qquad \text{(System 5)} \\
&\left[\bar{w} l_w^{f3} + A_w^{f3} P\right]\left(1 + m_w^{f3}\right) + \left(\rho_f + \rho_a\right)\Lambda_g + \left|\rho_n\right|\Lambda_n = p_w^{"}
\end{aligned}$$

The price p''_w is given and the rent that has already been fixed for the category of homogeneous land Λ_f has no reason to change, since overall conditions of production have not changed. The only thing that can vary is the margin rate and therefore the rate of profit: we can see in this system of equations that the average margin rate, i.e. m^f_w existing for the three enterprises considered as a whole has been replaced by three separate margin rates m^{f1}_w, m^{f2}_w, and m^{f3}_w for each of the three firms, respectively. We thus verify that rent is not explained by scarcity: besides, the lands of fertility *f* may have any rank in the order of fertility. These homogeneous lands do not necessarily correspond to the marginal land, whereas in the example of Sraffa this additional hypothesis must be made so that his reasoning introducing scarcity can be pursued, or there is only one and unique category of land, which is even less realistic. But our reasoning remains nevertheless valid even if land Λ_f is replaced by marginal land Λ_n.

Indeed, Sraffa's mistake here is to confuse profit and rent: whether or not in the production process there are non-produced means of production such as land, the difference in production techniques within a branch producing the same product is inevitable, unless we assume that there is only one firm per branch, which would be absurd. Even the fact that a given firm employs only one technique is surely infrequent, since fixed capital is rarely replaced in a block and at the same point in time, which at all times leads to the coexistence of techniques of a slightly different nature in the same firm. Consequently, it is the difference in production techniques, and not scarcity, which explains the differentiation of profit rates within the same industry.

This analysis allows us to conclude by validating our initial statement: just as profit does not reward productivity, but the property of means of production, rent as well rewards the property and not the "fertility" or "scarcity" of land or any other non-produced means of production. Profit and rent are therefore revenues of the same nature, since both are levied on surplus-value, and suppose the redistribution of this surplus-value, of which they represent distinct parts. This implies that owners of non-produced or rent-producing means of production are competing, whether they realize it or not, with the other owners of other means of production for the redistribution of this surplus-value.

This redistribution of surplus-value, however, is effected in different ways. Profit is taken to allow the replacement of fixed capital supposed to have been consumed in the production process, through the depreciation of capital in use, but it is easy to understand that it is also used to a large extent for the consumption of capitalists. Rent is levied by the owners of unproduced means of production, who may also be capitalists, who are not prohibited from purchasing land or other unproduced means of production. With respect to the use of rent under the analysis developed so far, rent can be consumed or used for the purchase of fixed capital,

being understood that in the latter case landowners also become capitalists. Moreover, and as we have shown, rent takes two different forms, which are of the same nature, but which can nevertheless be analytically distinguished: differential rent and absolute rent, and on this point one can only partially correct Marx.

Differential rent is due to the heterogeneity of land, to their difference in "fertility." Knowing that the order of land classification may vary according to the change in the rate of profit and the price system, there is nothing such as an absolute fertility, which is why we must be careful when using this term. But the phenomenon corresponds in any case to what Marx called differential rent of type I. On the other hand, with regard to what Marx called differential rent of type II, resulting from differences of production techniques on homogeneous lands, and which Sraffa considers to be a rent of scarcity (of this homogeneous land), it has been demonstrated that this rent does not exist as such, because it actually resolves in profit rate differentials. Marx and Sraffa are therefore both wrong on this point.

Of course, this position is partly a question of vocabulary, but if we agreed to name rent what is in fact a difference between rates of profit in the production of the same good, then there would be rents everywhere. This is nevertheless the position of a few economists, such as Jean-Marie Huriot, in an article of synthesis, published in 1983: *Rentes Différentielles et Rentes Absolues: Un Réexamen* [Differential Rents and Absolute Rents: A Review] (Huriot 1983). It is true that for this economist, rent always refers to scarcity, and that scarcity is everywhere, whereas in the analysis which has just been conducted rent has been explained without needing to introduce the concept of scarcity. It is therefore essential to reserve the term "rent" not only to the case where non-produced means of production are the object of private property, but also to cases where the difference in production costs arises from the heterogeneous nature of these non-produced means of production, and not just from differences in the nature of the techniques employed. Otherwise, even with the existence of non-produced means of production, it would be much better to use the term quasi-rent, which would therefore correspond to the differential rent of type II for Marx or to homogeneous land with different techniques for Sraffa.

The Particular Case of the Rent of "Location"

An example will make it easier to understand, which is the case of the rent of location. If it is simply what Huriot names in his above-cited article "Differential Rents and Absolute Rents: A Review," which is noted by him as ρ_{δ}, this "rent" arises from the greater or lesser distance from a land in relation to the market (the furthest one being the rent-less land). However, if we go back to our example of wheat production, this "rent" is in fact based on the simple addition of a transport cost more or less proportional to this distance among the inputs of wheat

production. The greater the distance to the market, the more distant the land and the higher the transport cost, hence the lower the rent, to the point of canceling out at the maximum economically possible distance, that of the marginal land. To understand this particular type of rent, the best thing to do is certainly to isolate the effects of distance, by assuming first that all the lands are homogeneous as regards their "fertility" or physical yield for a given technique of production.

It should be noted that a higher transport cost does not constitute an intrinsic and as such a permanent characteristic of the lands involved, such as their productivity, or to be more precise their physical yield (for instance, in bushels of wheat per hectare). Indeed, the distance to the nearest marketplace and thus transport costs can change at any time due to the opening of a new and closer marketplace. In any case, whether all the lands involved have or do not have the same "productivity," a higher transport cost actually is in fact similar to a change in the production technique, in which transport services have an increasingly important "technical" coefficient, as the distance of the cultivated land to the market increases.

If the price of the product, like wheat in our example, does not change, this reduces the profit margin and rate of profit in relation to the average rate of profit on all the lands concerned by the production of wheat. Relaxing the hypothesis of homogeneity in fact does not change this observation: whether the lands are homogeneous or heterogeneous, one can have lands otherwise highly fertile at a great distance, and less fertile lands nearby, or homogeneous lands at different distances. It is only if the profit rate remains unchanged when the distance to the market increases—and thus the transport cost, that the rent on the corresponding land has to be adjusted downwards: this will depend on the balance of power between landlords and farmers.

In these different cases, since it is a non-produced means of production—i.e. land, which is used, and since it is one of its characteristics (its distance to the market), which is involved, although it is an extrinsic and variable one, it seems more appropriate to use the term quasi-rent for surplus profits or higher rents resulting from the difference in transport costs with respect to the most distant land, on which there is no quasi-rent of "location," this term meaning in fact "distance to the market." On the other hand, if any manufactured good is produced at different distances to the market, then the difference in transport costs is equivalent, from a formal point of view, to a difference in techniques. But if there is no use of non-produced means of production, the differences in the rates of profit resulting from this difference in techniques, in our opinion, do not justify in any case the use of the terms rent or quasi-rent in relation to and as a kind of explanation for these differences.

In both cases, however, what also justifies not using the term "rent" is that the price of the produced commodity remains unchanged, as there is no particular reason for it to change as long as no new land is brought into cultivation, whereas

in the case of rent proper we saw well that its existence, whether differential or absolute, was independent of the availability or not of new lands, and necessarily raised prices. On the other hand, in the case of a quasi-rent of "location," there is no rent strictly speaking because the distance to the market is contingent and not permanently and intrinsically attached to the property of a land. All the more so that it is sufficient for a market to change its location for quasi-rents or profit rate differentials to be modified, without any change in property rights.

The Effect of Rent on the Price System and Distribution

The Effect of Rent on the Price System

It is System 4 above that fully accounts for the effects of rents on the price System. Compared to the price system that would prevail in the absence of rent and would result in an average price of wheat equal to p_w, it shows that taking rent into account leads to a price increase, such that the unit price of wheat p_w is increased by the amount of rent, and thus becomes:

$$p_w^{"} = p_w^{'} + \rho_a \Lambda_i \text{ with } \rho_a > 0, \sum_{i=1}^{g-1} \rho_i > 0 \text{ and } \sum_{i=g+1}^{i=n} \rho_i < 0 \tag{14}$$

And since we have: $p_w^{'} = p_w + \rho_i \Lambda_i + \mid \rho_n \mid \Lambda_n$ (see System 3), we get:

$$p_w^{"} = p_w^{'} + \rho_a \Lambda_i = p_w + \left(\rho_i + \rho_a\right) \Lambda_i + \mid \rho_n \mid \Lambda_n \tag{15}$$

Equation (15) shows that in the real world—apart from the marginal non-produced means of production, on which there is no differential rent, there is no such thing as a "pure" rent, because all rents are a combination of a differential rent and an absolute rent.

We recall that ρ_a is the level of absolute rent, which must be paid even to the owner of the least fertile land to make him decide to rent his land, and that $\rho_n|\Lambda_n|$ is equal in absolute value to the amount of the deficit (which we called negative rent) that would appear on marginal land if the price of wheat were set at the level corresponding to the average rate of profit and the absence of rent. The level of ρ_n is not arbitrary, since it is determined for a given price system and a given rate of profit by the conditions of production on the least "fertile" land. On the other hand, the level of ρ_a depends on what might be called the balance of power between owners of non-produced means of production and capitalists who pay the rents. In the real world, this balance of power is generally arbitrated or regulated by the state. But in the case of some primary commodities like oil, the level of ρ_a can also be the subject of negotiations between states and oil companies, and even of

conflicts between states, as shown by the way oil prices are set at world level, or oil fields are exploited, often on the basis of the Production Sharing Agreements previously mentioned.

The Effect of Rent on the Distribution of the Product

If we want to now understand the effect of rent on the distribution of the overall product between stakeholders, i.e. workers and capitalists, we need to adopt a measure of the product which is invariant to distribution, or changes in, for instance, the rate of profit. The only way to do this is therefore to refer to the value of the final product, defined at the level of the production process alone, before any distribution, as the labour-value of the product, i.e. the overall amount of direct labour spent in the production process.

Let us call L this overall quantity of direct labour, which gives us the total value of the product. Let us also consider that in the production process a quantity L_I is spent in what we define as Section I producing fixed capital goods and a quantity L_{II} is spent in what we define as Section II producing consumption goods. We thus have $L = L_I + L_{II}$, meaning that the value produced is the sum of the value of capital goods and consumption goods.

In a very simple model, where only workers consume, buying all consumer goods that are produced, and where capitalists do not consume and only buy fixed capital goods, then workers get a value L_{II} and capitalists a value L_I. On such a simplified basis, it is very easy to synthesize the distribution of the overall product between both groups, by introducing a new variable, called—following Marx—the rate of surplus-value, defined as the ratio of the value distributed to capitalists and the value distributed to workers. Let us call k this rate; it is thus:

$$k = \frac{L_I}{L_{II}} \tag{16}$$

If we want to adopt a more realistic view of distribution, we must go one step further, and assume that capitalists—like workers, need to consume. Let us consider that in the distribution process they obtain a share called c of the total value L_{II} of consumption goods (part of it being made, for instance of "luxury goods"), which implies that workers necessarily get a share $(1 - c)$ of this value of consumption goods. It is easy to see that the new rate of surplus-value corresponding to these assumptions, which we call k_c, becomes the ratio:

$$k_c = \frac{L_I + cL_{II}}{(1-c)L_{II}} = \frac{kL_{II} + cL_{II}}{(1-c)L_{II}} = \frac{k+c}{1-c} \tag{17}$$

To allow for capitalists to levy a surplus-value corresponding to such a rate k_c means that consumer goods must be sold to workers at a price higher than their

value L_{II} by an amount of $k_c L_{II}$. This implies that the price of consumption goods, which we call Y_{II}, must be set at:

$$L_{II} + k_c L_{II} = L_{II} + L_{II} \frac{k+c}{1-c} = L_{II} \left(1 + \frac{k+c}{1-c} \right) \Rightarrow Y_{II} = L_{II} \frac{1+k}{1-c} \tag{18}$$

On the basis of these assumptions and definitions, the effect of rent on the rate of surplus-value and on the redistribution of surplus-value is different according to whether rent appears in the production of consumer goods or in the production of fixed capital, i.e. in Section II or in Section I of the production system.

With respect to a situation where there is no rent, and with the assumption of a constant profit rate, the levy of rent in Section II results in an increase in the overall price of consumer goods, which is thus equal in the absence of rent to $Y_{II} = L_{II} \frac{1+k}{1-c}$. Since L_{II} and k do not vary, the introduction of rent is equivalent to an increase in c (the share of the value of consumption going to capitalists) by an amount c'_{II} (with $c + c'_{II} = c'$). This amount c'_{II} is the share that the consumption of rent receivers in Section II represents in total consumption. The overall price of consumer goods thus becomes Y'_{II}, which is equal to:

$$Y'_{II} = L_{II} \frac{1+k}{1-\left(c + c'_{II}\right)} \tag{19}$$

In Section I, the drawdown of rent results in an increase in the price of fixed capital. It would be too long in the context of this article to demonstrate how the price of fixed capital in Section I is determined, which involves the redistribution of surplus-value levied in Section II from capitalists of Section II to capitalists of Section I, on the occasion of the buying of fixed capital goods by the first ones from the last ones.

The full demonstration of this process is nevertheless available in my previously cited book (Flamant 2018), and readers may refer to it. Let us assume therefore that the price of fixed capital produced in Section I, in the absence of a rent and with again a constant profit rate, is equal to:

$$Y_I = \frac{L_I}{(1-a)(1-c^*)} \tag{20}$$

In this equation, a represents the share of the value of fixed capital used in Section I, and c^* is a parameter setting the consumption of all capitalists of Section I.

The introduction of rent in this section can only take the form of an increase in total rent corresponding to c'_I, i.e. the additional share of total consumption

obtained by rent receivers in Section I. The price of fixed capital produced in Section I then becomes:

$$Y_I = \frac{L_I}{(1-a)\left[1-\left(c^* + c^{*\prime}\right)\right]} \tag{21}$$

As for the rate of surplus-value, which is $k_c = \frac{k+c}{1-c}$, only the rent affecting the price of consumer goods modifies it, by increasing it to $k_c^{'} = \frac{k+\left(c+c^{'}\right)}{1-\left(c+c^{'}\right)}$, and with $k_c^{'}$ corresponding also to the profits/wages ratio in Section II. The consumption of rentiers in Section II is therefore levied on the consumption of workers. On the other hand, rent levied in Section I does not modify the rate of surplus-value, but affects the distribution of surplus-value to the detriment of capitalists: the consumption of rentiers in Section I is deducted from the total consumption of capitalists, through the rise in the price of fixed capital caused by the collection of the rent.

Now that these clarifications have been made, we shall try to briefly answer the question of what the distinct effects of an increase in differential rent or absolute rent may be.

In the first place, an increase in absolute rent without an increase in differential rent implies that the use of non-produced means of production remains unchanged. To take the example of wheat, there is no increase in wheat production and therefore in the cultivation of new, less fertile land. We are then brought back to the analysis which has just been made of the introduction of rent, which necessarily includes an element of absolute rent, in a system in which there was no rent. We have just seen that the introduction of rent comes down to levying a share of surplus-value on the sale of any good or service by selling it with an unchanged value, but at an increased price that integrates the amount of the rent. As such, this price is therefore situated above the price that would result from the application and the collection of the average pre-existing rate of profit for the production system and the section concerned. This is not linked to an increase in the cost of production itself, but is due to the fact that the producer of that good or service is subject to the market power of the owner of non-produced means of production, with the assumption that he can pass on the amount of this rent in his sale price.

The mechanism for levying this amount is in any case similar to that which makes it possible to realize a surplus-value in the form of profits through the fixing of prices, which clearly shows the common nature of rent and profit, either in the form of average profits or of quasi-rents. Depending on whether the commodity, for which the pricing power generates a rent or quasi-rent, is produced in Section I or Section II, levying an absolute rent or a quasi-rent actually amounts, as we have

seen, to an increase in the value of variables c or c^*, and thus increases the price of consumer goods or fixed capital at the global level.

We also just saw that the increase of c leads to an increase in the rate of surplus-value k_c. The result on the overall rate of profit will be analyzed later, but the object of this article is not to carry out a detailed analysis of all the consequences of an increase in the amount of absolute rent. It is important to note, however, that the appearance or increase of an absolute rent or a quasi-rent in a production system can only have a disruptive effect on the realization of the product at global level, since such a phenomenon necessarily modifies the conditions for the sharing of surplus-value and hence for the realization of profits, which depend in part on the successive expenditure of previously realized profits.

In the case of workers, the increase in surplus-value necessarily triggers a reduction in their share in total consumption (hence in their demand for consumer goods), and in a decrease in the value of labour-power. As regards to capitalists now, there is no particular reason to imagine that the collectors of absolute rents and quasi-rents spend them in conditions that make it possible to keep unchanged the reproduction of the system.

In particular, if the collection of a rent or a quasi-rent concerns the sector producing fixed capital, two cases are possible. If capitalists of Section I can pass it on through their price, they will keep their profits at an unchanged level. But if they cannot pass it on through their own price, the result is a corresponding reduction of their profits for capitalists of the same section. To avoid it, they will therefore seek to pass on the corresponding levy by reducing wages.

As for capitalists of Section II producing consumer goods, in reaction to the rise in the price of fixed capital resulting from the appearance or increase of a rent in Section I, they are able to directly increase the rate of surplus-value by increasing the price of consumer goods. But if they cannot pass on the rent increase through an increase in their price to maintain their own profits, they too will seek to reduce wages. Let us conclude, then, that any increase in a rent or a quasi-rent can only have an inflationary effect and create a strong incentive for a fall in wages, and the cumulative effect of these two phenomena must inevitably lead to a fall in the consumption of workers.

As regards the effects of an increase in differential rent, they are complex, and therefore will be analyzed only very briefly here.

To limit ourselves to a few preliminary considerations, the effects of differential rent are not necessarily those foreseen by Ricardo in his work (Ricardo 1815). Indeed, the increase in differential rent linked to its use for the production of new non-produced means of production, in this case linked to the cultivation of new lands, can be analyzed as resulting from an increase in the average cost of the commodity concerned.

Indeed, since the price integrating the differential rent is $p_w^{'} = p_w + | \rho_n | \Lambda_n$, this means that on the new marginal land the negative differential ρ_n between the cost of production and the average price (excluding rent), i.e. p_w, has increased. Moreover, even with an unchanged production technique on newly cultivated land, the decrease in the quantity of wheat produced resulting from the lower "fertility" of this land is equivalent to an increase in the unit value of the commodity concerned, which comes from an increase in direct labour (l_w) as well as indirect labour (vector A_w) used in its production. In both cases, this increase in value reflects an increase in the cost of production. But this does not have the same effect according to the section concerned: it raises L_I if the non-produced means of production concerned is used for the production of fixed capital, or L_{II} if the non-produced means of production concerned is used in the production of consumer goods.

In the first case, we have an increase in the rate of primary surplus-value $\frac{L_I}{L_{II}} = k$, and in the second case, a decrease of this rate! Since $k_c = \frac{k+c}{1-c}$, we can deduct from this that, in the first case where the increase in differential rent occurs in Section I, there is an increase in k_c. Its influence on the rate of profit will be touched upon later. The parallel increase in variable $c^{*\prime}$ has no effect on the rate of surplus-value.

On the other hand, in the second case, where the increase in differential rent occurs in Section II, things are not as simple. Since $k_c^{'} = \frac{k + \left(c + c^{'}\right)}{1 - \left(c + c^{'}\right)}$, the decrease in k resulting from the increase in L_{II} goes indeed in the direction of a decrease in $k_c^{'}$. But if capitalists of Section II can raise their prices up to the increase in differential rent by passing it on to the prices of consumer goods, then the corresponding fall in the rate of surplus-value $k_c^{'}$ is offset by the increase in c', the share of the consumption of rentiers in total consumption, which is added to variable c whose level remains unchanged. The question of knowing whether the final result will be a fall or an increase in the rate of surplus-value k_c depends on the values taken by k and c'!

It is therefore only in the first case, where differential rent increases in Section I, that one is assured to be in the "Ricardian" situation where an increase in differential rent and the rate of surplus-value entails a decline in the rate of profit. In the second case, where differential rents increase in Section II, a fall in the rate of profit remains possible, but not certain, if the increase in L_{II} and the decrease in k are strong enough to prevail on the rise of c'.

However, and in both cases, an increase in differential rent necessarily entails a redistribution of surplus-value, and therefore a modification of its distribution to the detriment of capitalists and in favor of rentiers. These preliminary considerations as regards the consequences of differential rent will thus be no more developed.

At this point, it is now time to briefly address another tricky issue, that of urban land rent, which we will do in the next section.

The Question of Urban Land Rent

A remaining issue is indeed the question of urban land rent, which is in fact rather different from that of agricultural land rent, in many respects. Before highlighting these differences, let us recall that what is produced on urban land is real estate in the form of buildings or houses, but for the sake of simplicity we will call buildings everything which is produced on urban land. A first and fundamental difference between agricultural and urban land is that urban land does not participate in any way in the actual production process itself. Whatever its nature, it is but a mere substratum for the construction process, in which it does not play any other role. Second, it is clear that in the real world and real cities the market price of buildings, even if the buildings themselves are identical, is very different from one building and thus one location to another, with a kind of law often referred to saying that this price is inversely proportional to the distance from a city centre. This is also a big difference with agricultural land, where the price of wheat is unique, and in itself prevents us from using the same equation for defining the market price of a building, wherever its location may be.

If we assume that buildings and therefore their production costs are identical, but have different selling prices, we can infer that this situation is *de facto* exactly the opposite of the situation that we had in the case of agricultural land:

In the case of agricultural land rent, we have one commodity, i.e. wheat, that has the same and unique selling price p_w and different production costs depending on the type of "fertility" or contribution to the production of the particular piece of land where it is cultivated, and it is this difference in production costs which explains the differing levels of rent, called for this reason differential rent, due to this heterogeneity in the intrinsic characteristics of the land.

In the case of urban land rent, we have the same commodity, i.e. buildings, with the same production cost, which has different selling prices, depending on the price of land or the amount of rent paid for the property or use of each type of land on which buildings are built: the price of land is reflected in their price. It is therefore the difference in the price of different pieces of land which must be explained first. Since it cannot be explained by a difference in production costs strictly speaking, all the more so that land itself is not produced, we have to find out another explanation.

The solution to this problem is not difficult to understand, as soon as we realize that this last situation corresponds exactly to the assumption made by the neo-classical microeconomic approach to tackle this problem. Indeed, in any urban area, we have a

limited and invariable quantity of each type of land of a different location, land being furthermore not produced. Therefore, the supply curve for land has to be replaced by a vertical line. Thus it cannot be anything else than the various demand curves for each type of land, which can determine the price for each of these different types. But then the equations giving these prices will necessarily be quite different from what they were for agricultural land, as shown below.

To translate the phenomenon of urban land rent into equations, we consider that the price system is given, including the average price of production without any rent p_b in the branch producing buildings and the average profit margin m_b in this same branch (letter *b* being for building). The price of any building is the sum of wages paid for a given quantity of direct labour-time, i.e. $\bar{w}l_b$, plus the cost of all the intermediate commodities needed as inputs for a building, i.e. $\sum_{i=1}^{i=k} a_{ib}p_i$, to which must be added the profit margin, so that for a particular type of land, the equation giving its production price without rent is:

$$p_b = \left[\bar{w}l_b + \sum_{i=1}^{i=k} a_{ib}p_i\right]\left(1+m_b\right) \tag{22}$$

Let us call A_b a row vector such as $A_b = a_{1b}, a_{2b}, ..., a_{kb}$, whose elements are the share of the total production of each intermediate commodity going into the production of commodity *b*. Let us also call *P* the usual column vector of prices for *k* commodities.

We can now make land appear in the picture, as well as all of the particular types of land, supposing that there are *n* such types, each having its particular amount of rent. Let us call $\Lambda_1, \Lambda_2, ..., \Lambda_n$ the identical physical quantities of the various urban lands of the same surface for *n* different types of land, so that in fact $\Lambda_1 = \Lambda_2 = ... = \Lambda_n = \Lambda_u$. The equation giving the prices of buildings must now be replicated *n* times within the price system, with *n* different prices $p_b^1, p_b^2, ..., p_b^n$ for the *n* types of land. Then we can write:

$$\begin{aligned}
&\left[\bar{w}l_b + A_bP\right]\left(1+m_b\right) + \rho_1\Lambda_u = p_b^1\\
&\left[\bar{w}l_b + A_bP\right]\left(1+m_b\right) + \rho_2\Lambda_u = p_b^2\\
&.....\\
&\left[\bar{w}l_b + A_bP\right]\left(1+m_b\right) + \rho_n\Lambda_u = p_b^n
\end{aligned} \tag{System 6}$$

In such a system, there is no room for any differential rent, since the costs of production are supposed to be all the same, because urban land itself does not contribute to production strictly speaking, which is the big difference with agricultural land. Moreover, apart from their location, all the characteristics of the various types of land can be exactly the same. Thus all the rents which appear are

consequently absolute rents, with n levels going from the smallest to the highest: $\rho_1, \rho_2, ..., \rho_n$, which explains the n prices for the same commodity, a building. Each level can be explained by a different and growing demand curve for the same quantity, but a higher "quality" of land. This "quality" obviously depends on the location of a particular land, but the "quality" of this location depends itself on many factors that are not simply economical or coming from objective factors, like the distance from the city centre, but are linked to historical, sociological, cultural, political, institutional, or local realities.

The influence of these last factors is impossible to determine by rational calculation, all the more so that speculation can also be an important determinant of demand, as it was the case at the time of the big financial crisis of 2008. At the time, the growing amount of loans made by banks for the purchase of real estate also played a very important role. Since then, it is the importance of money creation by central banks, uncorrelated to production, which tends to induce massive purchases of existing assets, such as shares on the stock markets or real estate on the housing markets.

We can observe that even in the case of what could be considered as a "marginal" piece of urban land, i.e. the last piece of land where construction has been authorized and that has been serviced and made viable to be built on, on the outskirts of a city the selling price is higher than the cost of adjacent agricultural land under cultivation, plus the cost of servicing. This phenomenon can be observed even though agricultural and urban lands are not only adjacent but belong to the same category of land. This cannot be explained therefore by a differential rent, but rather like two different absolute rents coming from the differential income which can be obtained for a same surface from a building and from an agricultural product like, for instance, wheat. The change of status of land resulting from the building permit issued by the competent authority plays a primary role in this matter.

Finally, let us state again that there is no ground to speak of differential rent in the case of various urban lands. Indeed, and it is also a big difference from agricultural land, the costs of production strictly speaking of identical commodities, like buildings produced on different urban lands, have no reason to be different, because there is no particular characteristic of these lands which would make these costs differ, whereas in the case of agricultural land it was precisely this difference in production costs deriving from the difference in yields which explained the existence of differential rent.

The last difference between agricultural land rent and urban land rent can indeed be identified in the mechanism behind the determination of their price. In the case of agricultural land rent, the price of lands of different "fertility" undoubtedly depends on the amount of the rent that each brings to its owner, by capitalization at the prevailing interest rate or average profit rate. The case of urban land rent is more complicated. Indeed, if we consider a new land which has never been used

for construction before and on which a new building is built, one may consider that it is its price that is going to determine this building market price, and thus the amount of rent paid by tenants to the owners of this building. Indeed, this would be consistent with chronology and logic, because to have rents you need first to have a building, and to have a building you need first to have land. But it must be stressed that the buyer of a new building (if it is a house) or the buyers of apartments (if it is an apartment building) may well buy to live for themselves, and not to rent. In this case, they are the ultimate payers of the urban rent, whereas otherwise they can pass it on to their tenants.

However, when a new building is built on existing urban land with a given location where many buildings have already been built around, their market price will be the benchmark price, and this last price may very well depend on the existing level of rents paid by tenants in this same area. Then the price of land will depend on the market price of the building, with the rent of this land being given by the difference between the new building market price and its cost of production. Even in identical buildings and for a similar surface these rents can in fact be very different from one location to another, depending on the category of urban land.

Finally, since buildings have a long lifespan, they can be sold again several times during this lifespan, and they will therefore be put on the market as second-hand goods. In fact, this kind of transaction concerning old buildings represents several times (four times in France) the number of transactions for new buildings. Moreover, in the long run, their price usually increases over the years, a characteristic which they share with works of art and collectibles. At this stage, we end up in the pure neo-classical situation, where sellers arrive at the market with an initial endowment of commodities already produced, sometimes a very long time ago. The price of buildings on such a market will certainly depend on the income that they can generate, and thus on the level of rents paid by tenants of buildings located in the immediate neighbourhood. Then the amount of these rents will determine the price of buildings, which will determine the price of urban land, a situation which is similar to that of agricultural lands. In both cases, no net income is generated at the global level, since rent is a transferred income.

Conclusion

The analysis performed so far now allows us to provide six main conclusions concerning rent, which hopefully should contribute to closing the debates on a number of issues raised around this question.

A first conclusion, with the value of a definition, is that rent is an income that comes from the property of non-produced means of production, such as land or mines, and is collected by the owners of these means of production.

A second one is that there are two kinds of rent: differential rent and absolute rent. Differential rent comes only from the heterogeneity of each type of non-produced means of production, i.e. from differences in their intrinsic characteristics, and varies according to this heterogeneity. Because of its origin in property rights, absolute rent is the rent perceived even on the least "productive" (i.e. with no differential rent) of a particular type of non-produced means of production (otherwise, it would not be rented). It is also perceived on all the other non-produced means of production of the same type.

A third conclusion is that there is no differential rent as such coming from the heterogeneity of the techniques that can be employed by various firms using homogeneous non-produced means of production, which already pay an absolute rent for their use. This heterogeneity of techniques only results in profit rate differentials. However, owing to the use of non-produced means of production, the corresponding differences in production costs from the average cost can be called "quasi-rents," to distinguish them from other types of profit rate differentials.

A fourth one is that actual rents are always a combination of differential and absolute rents, as well as occasionally quasi-rents. Whatever their combination, the nature of rent is not different from that of profits: rent is also a transfer income, which is levied as a part of total surplus-value. Changes in differential rents can result from an exogenous change in the price system. They also correspond to changes in the scale of production, implying the use of additional non-produced means of production (in the case of an increase). Such changes therefore always entail a change in the value of the product and the price system.

A fifth conclusion is that rent on urban land follows a different mechanism compared to rent on agricultural land, because in the case of urban land rent the same commodity, i.e. new buildings, with the same production costs, has different selling prices, depending on the price of land paid for the property of each type of land on which buildings are built. For new urban land, the price of land is reflected in the price of buildings. For lands where buildings were built a long time ago, it is more probable that the direction of causality be from rents to building price to land price. As for the difference in the prices of different types of urban land, it can be explained through the relative scarcity of each of these types. This brings us back to the neoclassical theory of rent: since there is a fixed quantity of each type of urban land, a partial equilibrium scheme seems to partially explain the formation of each of these prices, also subject to a number of influences going from politics to fashion.

A sixth and last conclusion is that theoretically, for a given and fixed value of the product, if an increase in rent (hence absolute rent) could leave prices unchanged, the amount of surplus-value would not change, and the amount of rent would be levied from profits. In practice, such an increase in rent will have repercussions on prices, whose magnitude depends on the balance of power between three involved groups of

agents: rentiers, capitalists and workers. The ultimate effect on the amount of surplus-value and its distribution between rentiers and capitalists will depend on the balance of power between these groups, under the arbitration of the state.

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