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GETTING RID OF RENT?

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Abstract

In order to extend the theory of value and the trade-off property to economic systems with lands, Ricardo reduced their study to that of productive systems without lands by considering the marginal agricultural methods. Sraffa generalised the analysis to prices of production and rejected the notion of order of cultivation. The strategy works sometimes for extensive cultivation, fails in most cases of intensive cultivation, and always when the net product of agriculture is increased by making use of corn saving methods in industry.

Key words: Land, Rent, Ricardo, Sraffa, Trade-off

JEL classifications: B12, B51, D24, D33

1 Introduction

In the last quarter of the twentieth century, the rise in the price of oil exerted long-term effects on productive systems. Two main types of adaptation can be distinguished. First, the higher price provided an incentive to produce more oil, because it made some costly fields profitable and led to the use of more productive methods on the existing fields and to the research of new fields. Second, oil saving methods have been operated. The classical theory of rent, as set out by Ricardo (*Essay*, 1815; *Principles*, 1817) and developed by his successors, proposes intellectual tools to understand these evolutions. The first effects concern the oil industry itself, and the phenomena at stake

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are related to the theory of either extensive or intensive rent. The study of the second effect is less clear: does the substitution lead to the immediate replacement of a method by another, as in the case of industrial processes when distribution changes, or to the coexistence of two methods, one being more expensive and more productive than the other, as explained by Sraffa (*PCMC*, 1960) for the intensification of cultivation? In any case, Ricardo was less interested in the distinction between the types of rent than in their theoretical unity, the unifying principle being that ‘the capital last employed pays no rent’ (*Principles*, Chapter 2). As a consequence, he argued, the labour theory of value still holds in the presence of lands (given our theoretical purpose, we will refer to agricultural products and lands rather than oil and oil fields), provided that one takes into account the marginal methods of production in agriculture. Translated in terms of the contemporary approach developed by Sraffa, who formalised the theory of prices of production and studied their properties, productive systems with lands behave like single-product systems. For Ricardo, their most important property is the trade-off between wages and the rate of profits. In the presence of lands, the property is enriched by an additional trade-off between rents and profits which justifies his plea for free trade.

In this paper, we review the different types of rent and reexamine the validity of Ricardo’s theoretical strategy, with a specific attention to two connected questions: is an economic system with land reducible to a system without land? does the trade-off property hold? Since our aim is to examine whether the analytical framework can be extended to the presence of lands, we do not discuss the labour theory of value itself and the same question applies to Sraffa’s formalisation. Sraffa’s critique of the notion of order of cultivation is deemed to lead to a greater generality without altering the attached economic properties. Section 2 reminds us the main features of Ricardo’s analysis of rent and their applications to the theory of extensive cultivation, which are more restrictive than expected. Section 3 on intensive rent explains the differences between Ricardo’s and Sraffa’s conceptions and shows that the adoption of Sraffa’s enlarged framework is made at the expense of a significant weakening in the properties of the economic system. Finally, Section 4 shows some dramatic consequences of the existence of a third type of rent for both Ricardo’s and Sraffa’s approaches.

2 Some features of Ricardo’s approach

The main potential objection to the labour theory of value does not concern ‘some rare statues and pictures’ (*Principles*, Chapter 1) but the use of

land in production, since land itself is not produced. Ricardo considered two possibilities, the extension and the intensification of cultivation, to overcome the scarcity of corn. The first process consists in extending production to another land and sustains the ideal type of rent: the marginal land, which is the least productive in use, pays no rent. By contrast, the intensification process consists in improving productivity on the same land. Have both processes the same economic properties? For Ricardo, their theoretical unity is rooted in the principle that the marginal capital pays no rent. Ricardo's analytical strategy is clearly explained in his letter to Mac Culloch dated 13 June 1820: 'By getting rid of rent, which we may do on the corn produced with the capital last employed, and on all commodities produced by labour in manufactures, the distribution between capitalist and labourer becomes a much more simple consideration' (*Works*, VIII, p. 194). Long-term prices are equal to the labour values determined by the industrial methods and the marginal agricultural methods. These values once obtained, the levels of the rents offset the cost differences between the marginal method and the others: prices are determined first, then rents. The formal two-step procedure reflects a logical hierarchy: '[T]he high price of corn [is] the cause of rent' (*Principles*, Chapter 2).

Ricardo's approach is dynamic. With the development of capitalism, more and more workers are employed and the net product of corn must increase. As long as the activity levels of the presently operated agricultural methods can be adapted to the evolution of demand, the prices and rents do not change. A limit is reached when some land becomes fully cultivated. Then the price of corn rises sufficiently to allow for the introduction of a new method, and that higher price sustains the payment of a rent on the previous marginal land. Prices and rents rise spasmodically whereas, on the physical side, one method of production is introduced at a low activity level and is progressively extended.

The notion of an order of cultivation is in line with the dynamic approach. Ricardo presumed that production on some quality of land would require more of each capital good than another ('Supposing then the land to be equally fertile, the necessity of employing more labourers, horses, &c. to carry the produce from the place where it was grown, to the place where it was to be consumed [...] would make it necessary that more capital should be permanently employed to obtain the same produce', *Essay*, p. 13); or: '[B]ecause *more* workers would be employed on the more distant or less fertile land, in order to obtain the same supply of raw produce', *Essay*, p. 18), so that the order of cultivation follows the ranking of lands according to intrinsic qualities. However, that answer does not suffice to determine the choice between an extension of cultivation on a land of lower quality and

its intensification on the same land, and Ricardo gave some hints on a more general criterion: a given amount of capital is invested in the place where it yields a maximum physical product of corn. In the *Essay*, calculations are made in terms of corn. An equivalent form of the criterion makes reference to prices, as in the note attached to the end of Chapter 2 of the *Principles* (the same numerical example is used later): Ricardo calculated the successive prices of corn associated with the successive marginal lands, and the order of cultivation coincides with the order of prices. The quantity criterion (maximum product) and the price criterion (minimum rise) are dual. In modern terms, the sequence of prices and rents follows from the law of the one and minimum price induced by competition between farmers.

In Chapter IX of *PCMC*, entitled ‘Land’, Sraffa adopted Ricardo’s dynamical approach in that he studied how the economic system adapts itself to the evolution of the net product: ‘The existence side by side of two methods can be regarded as a phase in the course of a progressive increase of production on the land’ (*PCMC*, Section 88). This statement is all the more noteworthy that it contradicts the explicit warning of the Preface (‘No changes in output [...] are considered’). Sraffa introduced a systematic distinction between capital as an amount of money and capital as a set of capital goods and adopted cost-minimisation as criterion for the choice of methods. Chapter IX is therefore intimately linked with Chapter XII, entitled ‘Switch in methods of production’. The universality of the cost-minimisation criterion makes Ricardo’s *a priori* ranking of the lands useless and can even serve to criticise that idea: as relative costs depend on prices and therefore on distribution, a cheaper agricultural method at some rate of profits may become more expensive at another rate and, then, the order of cultivation varies with distribution.

The study of extensive cultivation proper illustrates those general principles. To avoid any interference with intensive cultivation, we assume that each type of land is specialised in the production of a unique agricultural good and sustains a unique method of production. The prices are determined by the industrial methods and the marginal agricultural methods for the agricultural goods. As these methods constitute a productive system of the single-product type, one can conclude to the trade-off between wages and profits. Moreover, since rents increase spasmodically at the expense of profits, there is also a trade-off between rents and profits: ‘In the course of these observations, I have often had occasion to insist, that rent never falls without the profits of stock rising’ (*Essay*, p. 38); therefore, ‘the interest of the landlord is always opposed to the interest of every other class in the community’ (*Essay*, p. 21), a basic statement for Ricardo’s recommendations on economic policy. Ricardo’s assertions on land and rent seem fully justified. However,

the reader's attention must be drawn on the following point. In spite of common wisdom that extensive cultivation is well understood and constitutes a model for further studies on rent, the trade-off property has only been proved in a restrictive framework. Compare the following two statements:

- In a multisector model without land, there is a trade-off between wages and profits. The cost-minimising methods are indeed those which appear on the upper envelope of all r - w curves and, each curve being decreasing, the same for their envelope whatever the number of methods in each branch.

- In a multisector model with lands and extensive cultivation proper, the property holds if there is only one agricultural good and if the industrial methods are given (one method per industrial branch).

Since a marginal agricultural method pays no rent and can be identified with an industrial method, the reason why the first statement cannot be transposed to several agricultural goods and several methods in each industrial branch is unclear at this stage. We shall return in Section 4 to the reason of this unfortunate restriction (we should have written above that 'the prices are determined by the given industrial methods and the unique marginal method for corn').

3 Intensive rent and trade-off

In the *Principles*, Ricardo introduced the notion of intensive cultivation by the sentence: 'It often, and, indeed, commonly happens, that before No. 2, 3, 4, or 5, or the inferior lands are cultivated, capital can be employed more productively on those lands which are already in cultivation' (Chapter 2). To isolate intensive cultivation proper, let us assume that land is uniform in quality. Again, Ricardo assumed that the intensification process consists in depositing an additional layer of capital and labour over a pre-existing process. Sraffa made no hypothesis of that type and, for him, a more intensive process is 'more expensive and more productive' per acre. Intensive rent stems from the coexistence of two methods on a fully cultivated land: as the costs of production for capital and labour are lower for process A but process B is more productive, there exists a unique positive level of the rent per acre which uniformises the price of corn produced by both methods.

A reference to a corn model with land illustrates the gap between Ricardo's and Sraffa's conceptions and suffices to understand the points at stake in the theory of intensive rent. Let corn be produced by means of corn and labour on a homogenous and fully cultivated land. Following Sraffa, intensive cultivation is characterised by the coexistence of two agricultural methods,

which we write as

$$\begin{aligned} \text{(method A)} \quad a_1 \text{ qr. corn} + l_1 \text{ labour} + 1 \text{ acre land} &\rightarrow 100 \text{ qr. corn} \\ \text{(method B)} \quad a_2 \text{ qr. corn} + l_2 \text{ labour} + 1 \text{ acre land} &\rightarrow 185 \text{ qr. corn} \end{aligned}$$

By assumption, method B is more productive than A in terms of net product par acre ($185 - a_2 > 100 - a_1$) and the distribution variables are such that B is more expensive than A. The net product of corn is increased by extending the area cultivated by method B at the expense of method A. Ricardo's restrictive hypothesis is that the magnitudes $\Delta a = a_2 - a_1$ and $\Delta l = l_2 - l_1$ are both positive. Ricardo assumed that method A is first used on the totality of the soil, while the second process consists in spreading an additional layer of capital and labour on a part of the soil. In other words, in Ricardo's conception, the original data are represented by method A and another method Δ written as

$$\text{(method } \Delta) \quad \Delta a \text{ qr. corn} + \Delta l \text{ labour} (+ 1 \text{ acre land}) \rightarrow 85 \text{ qr. corn}$$

with the restriction that method Δ can only be used after method A. The production of corn is increased by extending the additional coat of capital and labour over the pre-existing method. As the rent per acre is entirely paid by the initial method (farmers do not pay the rent twice), the A- Δ model justifies Ricardo's claim that the marginal capital pays no rent.¹

Let us look at the determination of prices and rents and the trade-off property. In Ricardo's approach, the value of corn is entirely defined by the marginal conditions of production, i.e. by method Δ . Land is ignored as that method pays no rent. The value of corn once known, method A determines the rent per acre: the parallel with extensive rent is perfect. In Sraffa's approach, the price p (with labour as numéraire) and the rent ρ per acre are the solution to two equations:

$$(1 + r)a_1p + l_1 + \rho = 100p \tag{1}$$

$$(1 + r)a_2p + l_2 + \rho = 185p \tag{2}$$

Rent disappears by subtraction, and equation (3)

$$(1 + r)(\Delta a)p + \Delta l = 85p \tag{3}$$

¹In this respect, we disagree with Fratini's (2012) critique of Ricardo. Fratini starts from Sraffa's formalisation, which does not coincide with Ricardo's approach, and fails to identify the capital invested in method Δ as the marginal capital to which Ricardo refers.

determines the price of corn first. In a second step, the level of rent is found by returning to any of the original equations. The assumptions retained ensure that the price and the rent are both positive.

The formal similarity between Ricardo's and Sraffa's approaches hides deep differences in the interpretation and the properties of the model: if either Δa or Δl is negative, as admitted by Sraffa, the price equation (3) is not sustained by a physical method. As a consequence, for a zero rate of profits, the price of corn cannot be interpreted in terms of labour values. And, for positive rates of profits, the trade-off property between wages and profits cannot be presumed. To study that point, let us rewrite equation (3) with corn as numéraire. The transformed equation

$$(1 + r)(\Delta a) + w\Delta l = 85 \tag{4}$$

shows that the real wage w and the rate of profits r move in opposite directions when Δa and Δl are positive (Ricardo), in the same direction if one of them is negative (Sraffa)!

These conclusions extend to general multisector models: except in special cases, a productive system *à la* Sraffa with homogenous land cannot be reduced to a single-product system without lands. At an abstract level, the origin of the difficulty lies in the presence of negative multipliers in the standard system, as one must subtract the inputs of method A from those of method B to eliminate land from the input side (*PCMC*, section 87). But Sraffa did not draw the economic implications of that lacuna and his conclusions are over-optimistic.

4 The economic consequences of external rent

When demand evolves exogenously and corn becomes scarce, there are three and only three logical possibilities to overcome that limit by introducing a new method of production: either it is a new corn method on another land, or a new corn method on the same land, or it is not a corn method. The first possibility leads to the notion of extensive rent, the second to that of intensive rent, the third to that of external rent. In post-Sraffian economics, after Quadrio-Curzio's (1967) and Montani's (1972, 1975) initial studies, the first two notions have inspired dozens of papers and books (see e.g. Abraham-Frois and Berrebi, 1980; Bidard, 1987; Steedman, 1988; Kurz and Salvadori, 1995; Bidard, 2004). By contrast, the notion of external rent is hardly mentioned in the economic literature and, when it is the case, it is only set out as a curiosity. It was introduced by Saucier (1981) in his PhD thesis as 'external differential rent'. External rent has some similarity with intensive

rent, but its working relies on the interdependencies between industries and a substitution effect.

When corn is scarce, its price rises until a new method becomes profitable. In the *Essay* (p. 35), Ricardo claimed that only the price of corn changes, but he modified his opinion later: as corn enters into the production of the other commodities, their prices also increase, though in lesser proportions. These compensating variations are not mentioned in Chapter 2 of the *Principles* but are explicit in those devoted to taxation ('The probable effect of a tax on raw produce, would be to raise the price of raw produce, and of all commodities in which raw produce entered, but not in any degree proportioned to the tax', Chapter 9). For simplicity, let us retain Sraffa's assumption of a given rate of profits and consider a basic bisector model with, at the initial stage, one method producing corn and another iron (call it method C). Following an increase in the demand for corn and a rise in its price, the price of iron is adjusted in order to maintain the profitability of method C. The initial rise improves the profitability of all corn methods; the compensating rise for iron improves the profitability of those iron methods which make little use of the corn input and are therefore corn saving with regard to C. External rent occurs when the run to reach the normal rate of profits is won by an iron method D. Then method D operates side by side with method C, and the production of iron is progressively transferred from C to D. As each ton of iron produced by means of D instead of C saves corn, the net product of corn increases for an unchanged gross production. The new long-term equilibrium is made of two iron methods C and D operating jointly, while corn is produced on a fully cultivated land. The rise in the price of corn sustains the payment of a positive rent.

To illustrate the phenomenon, consider a basic bisector model with a given corn method on a homogenous land and two iron methods:

$$\text{(method C) } 2 \text{ qr. corn} + 1 \text{ labour} \rightarrow 1 \text{ t. iron} \quad (5)$$

$$\text{(method D) } 1 \text{ qr. corn} + l \text{ labour} \rightarrow 1 \text{ t. iron} \quad (6)$$

where the input labour l of method D is great enough (in that example, iron is not an input of its own production: this is a device to simplify calculations, but iron is a basic commodity as soon as it is used to produce corn). Method C is operated for low levels of demand because it is cheaper than D when the price of corn is low (l great enough). When the demand for corn increases and land is fully cultivated, the price of corn rises until method D becomes profitable. Methods C and D operate jointly in the new equilibrium, with a progressive transfer of the production of iron. Such a coexistence is reminiscent of intensive cultivation but takes place outside the branch in which scarcity occurs.

In more complex economies, the substitution effect may also take place in agriculture (joint use of two rice methods to increase the production of corn), and the direct and indirect interdependencies between industries are so complex that the emergence of an external rent is impossible to predict. Saucier (1981) showed that, when the response to the scarcity of corn leads to a progressive transfer of the production of rice, a rice land cultivated at low levels of demand may not be cultivated at higher levels. The phenomenon constitutes another critique of the notion of order of cultivation (for a given rate of profits). Similarly, a positive rent may vanish when demand increases.

The economic consequences of external rent are much more dramatic for Ricardo's construction than Saucier suggested: the corresponding equilibrium is not reducible to a single-product system. If the rate of profits is zero, the prices of corn and iron in terms of wage are calculated as the solution to the equations

$$2p_c + 1 = p_i \quad (7)$$

$$p_c + l = p_i \quad (8)$$

The prices once known, the level of the rent is determined by the agricultural method. Even if the usual two-step procedure (first the prices, then the rents) works, the formal solution (p_c, p_i) to (7)-(8) cannot be interpreted in terms of labour values since the conditions of production of corn do not intervene in the determination of its value. An economy reduced to methods C and D could not reproduce itself: the equilibrium is of a non-Ricardian type. When the rate of profits r is positive, the prices in terms of wage are defined by the equations

$$2p_c(1 + r) + 1 = p_i \quad (9)$$

$$p_c(1 + r) + l = p_i \quad (10)$$

from which there follows that the price of iron is constant and that of corn decreases with the rate of profits ($p_i = 2l - 1, p_c = (l - 1)/(1 + r)$). The real wage thus increases with the rate of profits.

The notions of external rent and non-Ricardian equilibrium often play a hidden role in the economic literature on rent:

- Salvadori (1986) established an existence result for long-term equilibria with scarce resources. No agent is in charge of checking whether the number of operated industrial processes coincides with that of industrial goods. Ricardian and non-Ricardian equilibria are interwoven, with switches from a type to the other when demand changes. There are strong reasons to think that non-Ricardian equilibria are frequent in complex economies.

- Bidard (2010) intended to elaborate a general theory of intensive proper for a given real wage, a unique quality of land and several processes in agriculture and industry. Once the real wage is incorporated into the input matrix, there is no longer explicit labour, but a uniform rent ρ appears in the price equations. The formal similarity with a single-product economy, with land and rent instead of labour and wage, seems perfect. One can draw the family of all $r - \rho$ curves, and the cost-minimising combinations of methods are those which lie on the upper envelope. Moreover, as two agricultural methods produce the same good, only the switch points on the envelope matter. The conclusion seems to justify Sraffa's statement: 'In the case of a single quality of land, the multiplicity of agricultural products would not give rise to any complications' (*PCMC*, Section 89). However, the construction relies on the implicit hypothesis that one method is operated in each branch, which is not the case for productive systems with land in a non-Ricardian equilibrium.

- Similarly, the restrictions mentioned at the end of Section 2 in the theory of extensive cultivation stem from the necessity to eliminate non-Ricardian equilibria: the uniqueness hypothesis on the industrial methods discards the coexistence of industrial methods producing the same good; the uniqueness of the agricultural good discards the joint use of two marginal rice methods in order to increase the net product of corn.

Is there a way to extend the expected results to several agricultural goods? A natural idea is to return to Ricardo and to assume that the agricultural methods can be classified according to the amounts of capital goods and labour employed per acre. Even then, the coexistence of two marginal rice methods in order to increase the production of corn cannot be excluded. Moreover, Ricardo did not set a similar hypothesis on industrial methods and, on the contrary, what is nowadays called the Ricardo effect points at the substitutability between capital and labour in industry, as in the above numerical example (5)-(6). Non-Ricardian equilibria cannot be excluded except in very specific configurations, and Ricardo's project to reduce the study of an economy with land to that of an economy without land fails in their presence.

5 Conclusion

The aim of Chapter 2 of the *Principles* is to consider 'whether the appropriation of land, and the consequent creation of rent, will occasion any variation in the relative value of commodities, independently of the quantity of labour necessary to production'. For contemporary economists, a similar question can be addressed to the theory of prices of production. Ricardo's and Sraffa's

idea is that the presence of lands has no major analytical consequence because one can get rid of rent by considering the marginal methods of cultivation. By contrast, our main conclusions are:

- As far as one considers extensive cultivation only, the elimination of rent from the analysis of value is limited to specific cases. Ricardo's reference to a natural order of cultivation, which Sraffa criticised, plays a central role in that operation.

- In the case of intensive cultivation, a similar hypothesis is also required, otherwise the reduction to a single-product system is not possible and the trade-off property does not hold, even in a corn-land model.

- Ricardo and Sraffa omitted the existence of a third type of rent. External rent occurs when the number of marginal corn methods does not allow to determine the price of corn and the rent. However, since another commodity is produced by two marginal methods (or by two methods, for an industrial commodity), the number of equations remains sufficient to determine prices. As the conditions of production of corn play no role in the determination of its price, the structure of these equations is deeply different from those associated with single-product systems and the extension of the trade-off property cannot be expected. The question of the impact of taxation studied in Chapters 8 to 18 of *Principles* should also be revisited.

These conclusions cast doubt on the relevance of the strategy adopted by Ricardo. Ricardo considered the question of rent as a main economic, social and political issue, but his theoretical message is that rent is analytically inessential. As the interactions between prices and rents are more complex than he thought, the question of the grounds of the Ricardian dynamics remains open.

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