

# Robert Torrens' Theory of Profit Reconsidered<sup>1</sup>

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**Abstract:** Two issues are addressed in this paper. First, I investigate Robert Torrens' theory of profit and argue that it is dependent on prices. Second, I determine the extent to which Torrens was an advocate of the corn-ratio theory and, in this context, re-examine Giancarlo de Vivo's claims that Torrens held such a theory. I argue that Torrens, for the sake of simplification, coincidentally made some formulations that are in conformity with a corn-ratio theory, but that he was not an advocate of this theory. I also conclude that Torrens' statements of indebtedness to David Ricardo cannot be taken as definitive 'further evidence' in favour of Piero Sraffa's famous interpretation of Ricardo's early theory of profit.

## 1 Introduction

Robert Torrens' theory of profit is reconsidered in this paper. Many commentators emphatically argue that Torrens' theory of profit entails a profit rate that is determined by the ratio of physical quantities of commodities, and stress that this theory is the germ of Piero Sraffa's 'Standard Commodity' or 'Standard System' (Langer 1982, pp. 398-9; de Vivo 2001, p. 698; Noguchi 1986, p. 14). I argue, by contrast, that he actually put forward a theory in which the profit rate is dependent on prices.

More specifically, Torrens' theory of profit has caused an intense debate over whether or not he was an advocate of the corn-ratio theory. In the 'Introduction' to Volume One of the Works of David Ricardo, Sraffa gives an interesting interpretation of Ricardo's early theory of profit: based on the 'rational foundation' of homogeneity between input and output in agriculture, the rate of profits in agriculture is determined by the ratio of two physical quantities of corn 'without any question of valuation', and thus the price of goods in other sectors must be adjusted so as to yield the same rate of profits as has been established in agriculture (1951, p. xxxi). This is called the 'corn-ratio theory'. This argument gave rise to a number of controversial exchanges between scholars of Ricardian economics, and these debates were subsequently reflected in a series of papers devoted to Torrens' corn-ratio theory (see Langer 1982; de Vivo 1985, 1986, 1996, 2001; Hollander 1995, 1998, 2001; and Peach 2001). My goal in this paper is to determine the extent to which it is plausible to argue that Torrens was an advocate of the corn-ratio theory and, with this end in mind, I re-examine de Vivo's views on this issue.

The paper is organised as follows. In Section 2, I examine the numerical examples concerning profit theory that appeared in the publication in which Torrens' theory is most clearly explained, namely, in the relevant chapter of the fifth edition of the *Essay on the External Corn Trade* (1829). It is shown that, in these examples and the related narrative, Torrens made the profit rate dependent on prices. In Section 3, I focus on the issue of whether or not Torrens advocated a corn-ratio theory and re-examine de Vivo's views on the matter. It is shown that Torrens was not an advocate of this theory and that his statement of indebtedness to Ricardo cannot be interpreted as definitive 'further evidence' in favour of Sraffa's

interpretation that Ricardo had put forward a corn-ratio theory of profit in his *Essay on Profits* (1815). My conclusions are presented in Section 4.

## 2 Profit Theory

It was in the third edition<sup>2</sup> of the *Essay on the External Corn Trade* that Torrens first and clearly presented his deterministic theory of profit. He made a distinction between (i) ‘Circumstances which determine the Rate of Profit before the Divisions of Employment are established’ (Torrens 1829, p. 95), (ii) ‘Circumstances which determine the aggregate Profit of the Community after Divisions of Employment are established’ (*ibid.*, p. 100), and (iii) ‘The Causes which regulate individual Profit, when the Divisions of Employment have been established’ (*ibid.*, p. 103). I shall examine Torrens’ calculation of the profit rate based on the above distinctions and thereby shed light on his original theory of profit.

### 2.1 ‘Circumstances which determine the Rate of Profit before the Divisions of Employment are established’

As to the case ‘that a patriarchal capitalist combines in his own person the different occupations of farmer and manufacture’ (Torrens 1829, p. 95), Torrens gives the following numerical example (*ibid.*, pp. 96-8). It is assumed that 450 quarters (qr.) of corn and 300 suits (s.) of clothing can be produced by expending 50 qr. corn as seed, material worth 50 qr., 200 qr. corn as food and 200 s. clothing. This assumption can be represented in the form of a relation between inputs and outputs in terms of corn and clothing as in Table 1.

**Table 1 Numerical Example I**

Input			Output	
Corn (qr.)	Clothing (s.)		Corn (qr.)	Clothing (s.)
300	200	→	450	300

According to Torrens, then, the rate of profit in Example I is 50%. He considers that the rate of profits in this state of society depends upon the *quantity* of commodity (*ibid.*, p. 104); and he calculates the rate as 50% on the following grounds: the surplus or profit obtained by the capitalist will be fifty per cent.; for, by the supposition, his advance of three hundred quarters of corn has procured him a reproduction of four hundred and fifty quarters, and his advance of two hundred suits of clothing a reproduction of three hundred suits. (*ibid.*, p. 96)

Torrens probably calculated the rate of profit in the following way. The surplus of corn is the *quantity* of its output minus the *quantity* of its input (150 qr. = 450 qr. – 300 qr.); the ratio of the surplus to input is calculated as 50% (=150 qr./300 qr.). While the surplus of clothing is also the *quantity* of its output minus the *quantity* of its input (100 s. = 300 s. – 200 s.); the ratio of the surplus to input is calculated as 50% (=100 s./200 s.). According to Torrens, the two ratios are equal and are identical with the rate of profits obtained by the capitalists. In short, the rate (*r*) is calculated in the following way:

$$r = \frac{450 - 300}{300} = \frac{300 - 200}{200} = 50\%.$$

Torrens therefore concluded that the rate of profit in 'that simple state of society in which the same capitalist carries on all the different branches of industry' (*ibid.*, p. 100) is determined as the rate at which the *quantity* produced exceeds the *quantity* employed in production.

### 2.2 'Circumstances which determine the aggregate Profit of the Community after Divisions of Employment are established'

As to the case of the 'more complex state of society in which the divisions of employment, and their consequences, barter and sale, are established' (Torrens 1829, pp. 100-1), Torrens gives the following numerical example (*ibid.*, p. 101). It is assumed that in agriculture 450 qr. corn can be raised by expending 150 qr. corn as food and seed plus 100 s. clothing; while in manufacture 300 s. clothing can be fabricated by expending 150 qr. corn as food and material plus 100 s. clothing. This assumption can be represented in Table 2.

**Table 2 Numerical Example II**

	Input			Output	
	Corn (qr.)	Clothing (s.)		Corn (qr.)	Clothing (s.)
Agriculture	150	100	→	450	0
Manufacture	150	100	→	0	300
Community	300	200		450	300

Torrens then calculated the rate of profit of 50%. He stated:

when the divisions of employment are established in any community, the aggregate rate of profit, or, in other words, the proportion in which reproduction exceeds the expenditure necessary to obtain it, is regulated by the self-same circumstances which regulate it in that more simple stage of society when the capitalist combines in his own person a variety of callings, and employs the same set of labourers to raise and fabricate the several commodities he consumes. (*ibid.*, p. 103)

Torrens therefore calculated the rate of profit in the same way as the previous case:

$$r = \frac{450 - 300}{300} = \frac{300 - 200}{200} = 50\%.$$

Torrens stated that 'the aggregate profit of the country [or the community] will be determined by the proportion between the *quantity* of production and the *quantity* of expenditure which obtains it' (*ibid.*, p. 105; italics added).<sup>3</sup>

### 2.3 'The Causes which regulate individual Profit, when the Divisions of Employment have been established'

Torrens stated: 'After the divisions of employment have been established, the particular profits of each individual capitalist will be regulated by a different principle from that which determines the aggregate profit of the community' (Torrens 1829, p. 103). The rate of 'particular profits of each individual capitalist' should be interpreted as the rate that ultimately becomes equal to the general rate of profit. Torrens went on to argue:

in the particular branches of industry, carried on by individual capitalists, the commodities produced cease to be homogeneous with the commodities expended in production; and therefore, the capitalist must replace his advances, not by directly appropriating a portion of his reproduction thereto, but by taking his commodity to market, and exchanging it for the several ingredients of capital employed in carrying on his business. Hence individual profits are regulated, not by the quantity, but by the value of the commodities produced. (*ibid.*, pp. 105-6)

In ‘the particular branches of industry, carried on by individual capitalists’, both input and output are usually heterogeneous because inputs are composed of several ingredients of capital while output consists of only one commodity. For example, in the second case examined above (Table 2), it is assumed that both in agriculture and in manufacturing, by expending two kinds of heterogeneous commodities as capital—such as corn and clothing—a single commodity of corn or clothing is produced. Considering only the agriculture sector—450 qr. corn can be raised by expending 150 qr. corn as food and seed plus 100 s. clothing—it is therefore impossible for the rate of profit in this industry to be determined in physical terms. The same applies to the manufacturing sector. Once the price of clothing in terms of corn is given, however, the rate of profit in agriculture is determined; and, given the price of corn in terms of clothing, the rate of profit in manufacturing is determined. These relative prices are determined by a system of simultaneous equations. In other words, the particular rates of profit in agriculture and manufacture sectors will ultimately equalise to the general rate of profit, which is dependent on price according to the following system of simultaneous equations:

$$(150 + 100p)(1 + r) = 450$$

$$(150 + 100p)(1 + r) = 300p$$

with  $p$  as the price of clothing in terms of corn and  $r$  as the general rate of profit. The results  $p = 1.5$  and  $r = 50\%$  can be obtained. This is the most likely way that Torrens calculated the rate of profit.

#### 2.4 *Calculating the Rate of Profit*

Two patterns of Torrens’ calculations of the profit rate have been examined above: with profits determined by the ratio of physical quantities and with profits dependent on prices. There is, indeed, some weakness in his accounts. In the two examples, the rate of profit happens to be determined by the proportion between the *quantity* of output and the *quantity* of input. To determine the rate of profit in such a way, however, the proportion in which the two commodities are produced must be equal to the proportion in which they are expended in their production. In Numerical Example I, corn and clothing are produced in the proportion 450:300 by expending corn and clothing in the proportion 300:200. And then the composite commodity is made up in the proportion 3 qr. corn:2 s. clothing. In Numerical Example II, corn and clothing are produced in the proportion 300:150 by expending corn and clothing in the proportion 200:100. And then the composite commodity is made up in the proportion 2 qr. corn:1 s. clothing. This approach allows Torrens to determine the rate of profit by the proportion between the *quantity* of output and the *quantity* of input. These constitute examples in which the physical proportions are accidentally identical.

In the very same chapter on profits, however, Torrens gave a numerical illustration of the determination of the profit rate with differing ratios of physical

proportions. Consider the following illustration in Table 3 (Torrens 1820a, pp. 399-401; 1829, pp. 111-13).<sup>4</sup> It is assumed that in agriculture 250 qr. corn can be raised by expending 100 qr. corn as food and seed plus 50 s. clothing; while in manufacture 150 s. clothing can be fabricated by expending 100 qr. corn as food and material plus 50 s. clothing. Then 'the rate of profit, both in agriculture and in manufacture,' must be about 36%—although Torrens himself miscalculated it as 38%.

**Table 3 Numerical Example III**

	Input			Output	
	Corn (qr.)	Clothing (s.)		Corn (qr.)	Clothing (s.)
Agriculture	100	50	→	250	0
Manufacture	100	50	→	0	150
Community	200	100		250	150

Now let us calculate the rate of profit in this example using the proportion of quantities argument. As to corn production of the whole economy, the ratio of the aggregate surplus to aggregate input is calculated as 25% (= (250 qr. – 200 qr.) / 200 qr.). Meanwhile, as to clothing production of the whole economy, the ratio of the aggregate surplus to aggregate input is calculated as 50% (= (150 qr. – 100 qr.) / 100 qr.). The two ratios are not equal. This stems from the fact that corn and clothing are produced in the proportion 250:150 by expending corn and clothing in the proportion 200:100. Consequently, 5 qr. corn:3 s. clothing ≠ 2 qr. corn:1 s. clothing. The rate of profit in this example therefore cannot be determined using proportion of quantities. In the determination of the profit rate here, Torrens took *value (price)* into account:

two hundred and fifty quarters of corn, and one hundred and fifty suits of clothing, being, by the supposition, equal in productive cost, will also be equal in exchangeable value.  
(*ibid.*, pp. 112-13)

In other words, it is very likely that Torrens determined the rate of profit in this illustration with the following system of simultaneous equations:

$$(100 + 50p)(1 + r) = 250$$

$$(100 + 50p)(1 + r) = 150p.$$

The results  $p \approx 1.67$  and  $r \approx 36\%$  can be obtained. The rate of profit must be dependent on the relative price. This calculation method determines the rate of profit irrespective of whether the proportion in which the commodities are produced is equal to that in which they are expended in production. Indeed, the rates of profit of Numerical Examples I and II can also be accurately derived under this calculation method. This is probably the very original theory of profit Torrens actually developed. In fact, Torrens states: 'Until we understand the nature and causes of value, the principles which regulate profit cannot be understood' (*ibid.*, p. 107).

Torrens' idea of determination of profits in Tables 1 and 2 resembles Sraffa's 'Standard Commodity' or 'Standard System', but three major differences can be identified. First, Torrens made absolutely no reference to the matter of quantity proportion, which is the essence of Sraffa's idea—this is a weakness in Torrens' account for these two examples. This implies a wide gap between these two ideas. The second point is related to Sraffa's statement: 'It can be said that in any actual economic system there is embedded a miniature Standard system which

can be brought to light by chipping off the unwanted parts' (Sraffa 1960, p. 20). Let us obtain from the above illustration (Table 3), as Sraffa (1960, pp. 19-20) does, 'a reduced-scale system in the required proportions' by taking the whole of the corn industry and 5/6 of the clothing industry. The resulting system is shown in Table 4.

**Table 4 Reduced-Scale System**

	Input			Output	
	Corn (qr.)	Clothing (s.)		Corn (qr.)	Clothing (s.)
Agriculture	100	50	→	250	0
Manufacture	250 / 3	125 / 3	→	0	125
Community	550 / 3	275 / 3		250	125

The proportion in which the two commodities are produced in this system (250 qr.:125 s.) is equal to that in which they are expended in their productions (550/3 qr.: 275/3 s.). The composite commodity is made up in the proportion 2 qr. corn:1 s. clothing. Therefore the rate of profit 'appears as a ratio between quantities of commodities irrespective of their prices' (*ibid.*, p. 22) as follows:

$$r = \frac{250 - 550/3}{550/3} = \frac{125 - 275/3}{275/3} \doteq 36\%.$$

Sraffa successfully and properly explains such a transformation from an actual economic system to a miniature Standard system, but Torrens was obviously not familiar with this transformation. The third difference arises because, in Torrens' model, unlike in Sraffa's, wage-capital goods enter as factors of production (cf. Noguchi 1986, p. 41).

Hence, unless we confine ourselves to the specific cases in Table 1 and 2, we should not regard Torrens' theory of profit as the foregoing theory of the 'Standard System' established by Sraffa. Nevertheless, Torrens' theory, in which the rate of profit depends on prices, can be considered as the germ of Sraffa's theory, which states that 'the distribution of the surplus must be determined through the same mechanism and at the same time as are the prices of commodities' (Sraffa 1960, p. 6).<sup>5</sup> It is in relation to this point that Torrens makes his contribution to the theory of profit and thereby to the history of economics.

### 3 **De Vivo's Interpretation of Torrens' Theory of Profit and Some Remarks**

In the 'Introduction' to Volume One of the *Works of David Ricardo*, Sraffa gives the following interpretation of Ricardo's early theory of profit:

At first, both in the *Essay* and in Ricardo's letters of 1814 and early 1815, a basic principle had been that 'it is the profits of the farmer that regulate the profits of all other trades'... After the *Essay* this principle disappears from view, and is not to be found in the *Principles*. The rational foundation of the principle of the determining role of the profits of agriculture, which is never explicitly stated by Ricardo, is that in agriculture the same commodity, namely corn, forms both the capital ... and the product; so that the determination of profit by the difference between total product and capital advanced, and the determination of the ratio of this profit to the capital, is done

directly between quantities of corn without any question of valuation. It is obvious that only one trade can be in the special position of not employing the products of other trades while all the others must employ its product as capital. It follows that if there is to be a uniform rate of profit in all trades it is the exchangeable values of the products of *other* trades relatively to their own capitals (*i.e.* relatively to corn) that must be adjusted so as to yield the same rate of profit as has been established in the growing of corn; since in the latter no value changes can alter the ratio of product to capital, both consisting of the same commodity. (Sraffa 1951, p. xxxi)

The theory of profit explained here by Sraffa is called a 'corn-ratio theory' or the 'corn model'. An intense debate over his interpretation involved scholars of Ricardian economics over decades, and a series of papers on Torrens' corn-ratio theory (which were cited in the introduction to this paper) appeared in relation to this debate. In this section I re-examine de Vivo's views on this issue.

### 3.1 De Vivo's Views

De Vivo (1985, p. 90) points out that Torrens, in the second edition (1820) of the *Essay on the External Corn Trade*, makes reference to the 'general principle, that in whatever proportion the quantity of produce obtained from the soil exceeds the quantity employed in raising it, in that proportion the value of manufactured goods will exceed the values of the food and material expended in preparing them' (Torrens 1820, p. 362). And he argues that Torrens actually employs the 'general principle' to determine the price of manufactured goods relative to corn in the following example (*ibid.*, pp. 364-5). It is assumed that in agriculture 125 quarters (qr.) of corn can be raised by expending 50 qr. corn as food plus 50 qr. corn as seed; while in manufacturing 150 yards (yd.) of cloth can be fabricated by expending 25 qr. corn as food plus material worth 50 qr. This example, which de Vivo follows, can be rewritten in the form of a relation between inputs and outputs in terms of corn and clothing as in Table 5.

**Table 5 Numerical Example IV**

	Input		Output	
	Corn (qr.)		Corn (qr.)	Cloth (yd.)
Agriculture	100	→	125	0
Manufacture	75	→	0	150

De Vivo gives the following interpretation of this example: 'The rate of profits will have now gone down to 25%, and the price of cloth in terms of corn ( $p$ ) will be equal to 0.62. This price is obtained by Torrens from the following equation:  $125:100 = 150p:75$ ; which can be written, in more familiar form, as  $150p = 75 (1 + 25\%)$ ' (1986, p. 29). This can be more clearly explained with the following system of simultaneous equations:

$$100(1+r) = 125$$

$$75(1+r) = 150p.$$

The result  $p = 0.625$  can be obtained, and is equivalent to the ratio of 150 yd. cloth worth about 93 qr. as calculated by Torrens. Because of the homogeneity

between input and output in agriculture, the rate of profits ( $r$ ) can be calculated as 25% independently of value (from the first equation); meanwhile, because of the non-homogeneity between input and output in manufacture, the rate of profits cannot be calculated independently of value, and the price of cloth in terms of corn is adjusted so as to yield the same rate of profit as has been established in agriculture. From this point of view, this example apparently takes a formulation in conformity with a corn-ratio theory—although this, as will later become clear, is a mere coincidence.

It should, however, be noticed that the above system of equations takes this form only if wage capital and non-wage capital are assumed to be homogeneous. But generally capital is heterogeneous, as de Vivo admits: ‘Torrens’s argument had a weakness, deriving from the fact that he ... does not regard capital as consisting merely of wages but also of “material”’. This does not affect the physical homogeneity of input and output in the production of corn where non-wage capital is also assumed to consist of corn, used as seed’ (1985, p. 91). He therefore regards Torrens as an advocate of the corn-ratio theory.

On the other hand, de Vivo (1986, p. 27) argues that ‘there are examples where a physical homogeneity is assumed between the whole product of the economy and the whole of social capital’. He quotes the same example that was presented in Section 2 of this paper (see Table 1), from the 1820 edition of the *External Corn Trade* (Torrens 1820, p. 386; 1829, pp. 96-7). De Vivo (2001, p. 698) considers an example, in which a physical homogeneity between product and capital is assumed at the economy level, as a generalisation of a corn-ratio theory. He therefore argues that, due to such an assumption, Torrens did not retreat from his advocacy of the corn-ratio theory.

Furthermore, de Vivo (1985, pp. 89-90) examines the ‘Preface’ of the second edition of Torrens’ *External Corn Trade*, in which there is a statement of indebtedness to Ricardo’s theory of profit. This paper cites the paragraph in full:

It may probably be asked why the Author, *in his chapter upon the profits of stock*, has made no allusion to the *works* of Mr. Ricardo, which contain so much original and profound inquiry into the laws by which the rate of profit is determined. The reason is this. In the *Essay on the Corn Trade* the language of economical science is often used in a sense different from that in which Mr. Ricardo uses it; and it was therefore apprehended that direct quotations from his work, instead of giving perspicuity to the argument, might have distracted the reader by verbal contrariety upon points concerning which there existed no real difference in sentiment. The experienced economist who can trace identity of principle through diversity of expression, will readily perceive in what degree the doctrines developed in the very original work upon Political Economy and Taxation have been adopted in the present edition of the *Essay on the Corn Trade*; and this general acknowledgment will be sufficient to convince the less curious reader that in omitting to refer to Mr. Ricardo on each particular occasion, in which his principles may have been embraced, it was not the intention of the Author to commit an act of plagiarism under the disguise of a different language and mode of illustration. (Torrens 1820, p. xix-xx; italics added)

De Vivo argued that 'it can be shown that Torrens wrote that work while being under the influence of Ricardo's *Essay on Profits*'; and he goes on to argue that 'Torrens formulated a corn-ratio theory of profits derived from Ricardo' (1985, p. 90). De Vivo's argument may be reduced to the following propositions:<sup>6</sup> (i) Torrens, in the 1820 edition of the *External Corn Trade*, explicitly acknowledges that the inspiration for his own corn-ratio theory comes from Ricardo's *Essay on Profits*; (ii) Torrens' theory of profit developed in the second edition of the *External Corn Trade* is a corn-ratio theory; (iii) the first two points, (i) and (ii), confirm that Ricardo put forward a corn-ratio theory in his *Essay*; and therefore, (iv) Sraffa's corn-ratio theory interpretation of Ricardo is correct.

### 3.2 Some Remarks

Hollander (1998, p. 620) and Peach (2001, p. 687),<sup>7</sup> contrary to de Vivo, point out that, as Torrens refers to 'the works of Mr. Ricardo', his statements of indebtedness did not refer to Ricardo's *Essay* alone; that is, that his statement of indebtedness is not only to Ricardo's *Essay*, but also to Ricardo's *Principles*, in which Ricardo abandons the corn-ratio theory. The heart of the issue, however, does not lie in discussing whether Torrens is indebted to Ricardo's work or works. The real issue is whether there is a corn-ratio theory in the 'chapter upon the profits of stock' of his *External Corn Trade*. I therefore turn to the question of whether Torrens puts forward a corn-ratio theory of profits ('in his chapter upon the profits of stock').

Torrens' 'chapter upon the profits of stock' is undoubtedly 'Chap. III.—*On the Influence of a free Trade in Corn, upon the Profits of Stock.—Further Examination of the Principles of Mr. Malthus*'.<sup>8</sup> In the same chapter, he gives the example contained in Section 2 (Table 3). This example has the following features: (i) agricultural capital consists of clothing as well as corn<sup>9</sup>; (ii) the proportion in which the two commodities are produced is not equal to that in which they are expended in their productions; and (iii) the rate of profit does not appear as a ratio of physical quantities, but depends on the relative price. These characteristics do not yield a corn-ratio theory of profits.

It also should be emphasised that there is another example in Chapter III of the *External Corn Trade* (Torrens 1820, pp. 394-8) in which it is assumed that in agriculture 450 qr. corn can be raised by expending 50 qr. corn as food, 50 s. clothing and 50 qr. corn as seed; while in manufacturing 150 s. clothing can be fabricated by expending 50 qr. corn as food, 50 s. clothing and material worth 50 qr.; then the general rate of profit must be 80%. This assumption can be rewritten in the form of a relation between inputs and outputs in terms of corn and clothing as in Table 6.

**Table 6 Numerical Example V**

	Input			Output	
	Corn (qr.)	Clothing (s.)		Corn (qr.)	Clothing (s.)
Agriculture	100	50	→	450	0
Manufacture	100	50	→	0	150
Community	200	100		450	150

Corn and clothing are produced in the proportion 450:150 by expending corn and clothing in the proportion, 200:100. Consequently, 3 qr. corn:1 s. clothing ≠ 2 qr. corn:1 s. clothing. Therefore the rate of profit in this illustration cannot be

determined as the ratio of physical quantities. It can be determined with the following system of simultaneous equations:

$$(100 + 50p)(1 + r) = 450$$

$$(100 + 50p)(1 + r) = 150p.$$

Then ‘the rate of profit, both in agriculture and in manufactures’ will be ‘eighty per cent,’ or  $r = 80\%$ ; ‘For four hundred and fifty quarters of corn and one hundred and fifty suits of clothing being ... equal in productive cost, will also be equal in exchangeable value’, or  $p = 3$  (*ibid.*, p. 396). The rate of profit must thus depend on the relative price.

Torrens goes on to illustrate: it is assumed that in agriculture 450 qr. corn can be raised with the same cost as before; while in manufacturing, as a result of increased productivity, 225 s. clothing can be fabricated with the same cost as before. This assumption can be rewritten in the form of a relation between inputs and outputs in terms of corn and clothing as in Table 7.

**Table 7 Numerical Example VI**

	Input			Output	
	Corn (qr.)	Clothing (s.)		Corn (qr.)	Clothing (s.)
Agriculture	100	50	→	450	0
Manufacture	100	50	→	0	225
Community	200	100		450	225

The rate of profit can be determined with the following system of simultaneous equations:

$$(100 + 50p)(1 + r) = 450$$

$$(100 + 50p)(1 + r) = 225p.$$

Then ‘the rate of profit, both in manufactures and in agriculture would rise from eighty to one hundred and twenty-five per cent,’ or  $r = 125\%$ ;<sup>10</sup> ‘For ... two hundred and twenty-five suits of clothing and four hundred and fifty quarters of corn will be equal in productive cost and in exchangeable value,’ or  $p = 2$  (*ibid.*, p. 397).

In this example, Torrens explicitly acknowledges, as Hollander (1998, p. 618) points out, that ‘the *general* profit rate varies not only with agricultural productivity but also with manufacturing productivity’. In acknowledging it, Torrens rejects the ‘basic principle’ of a corn-ratio theory: ‘it is the profits of the farmer that regulate the profits of all other trades’ (Sraffa 1951, p. xxxi).

Now consider the example in Table 5, cited by de Vivo (1985), in which he believes to have found a formulation of a corn-ratio theory. This example is in ‘Chap. I.—*On the relative Value of raw Produce and wrought Goods. Refutation of the Opinions of Adam Smith, and of the French Economists on this subject.*’ of the *External Corn Trade*, but not in Chapter III, which is devoted to profit theory. Chapter III of the *External Corn Trade* has absolutely no examples with formulation similar to that in Numerical Example IV (Table 5). This fact seems to work against de Vivo’s position.

There are other pieces of evidence working against de Vivo’s view. In ‘his chapter upon the profits of stock’, Torrens *never* made the assumption that in *agriculture* both inputs and outputs must be composed of the *same* and *single* kind of commodity. Also, as argued, he did not always assume that the proportion in which commodities are produced is equal to that in which they are expended in

their production. He did not exclusively calculate the rate profit as a ratio of physical quantities and, indeed, explicitly considered situations where the rate of profit depends on the relative price. Finally, he explicitly acknowledged that the general rate of profit varies with manufacturing productivity as well as with agricultural productivity. There is consequently evidence that he did not put forward a corn-ratio theory of profits *in this chapter*.

Now, one might ask why Torrens made the suppositions of homogeneity between inputs and outputs in agriculture, and gave a numerical example in which the rate of profit appears as the ratio of physical quantities. Perhaps the only reason is that he wanted to avoid the complexity of calculation and explanation. In the Appendix of the 1829 edition of the *External Corn Trade*, Torrens gave several numerical examples in agriculture, and stated, later on:

Hitherto we have taken our proofs and illustrations from agricultural labour, because in agriculture the principal things expended, such as food and seed, being homogeneous with the things reproduced, we are enabled to form a direct comparison between the quantities expended and the quantities reproduced, and thus to give a *simplicity* and distinctness to our illustrations, which could not otherwise be obtained. (Torrens 1829, p. 467; italics added.)

In short, Torrens, for the sake of simplification, coincidentally made some formulations that are in conformity with a corn-ratio theory, but he cannot be generally said to be an advocate of this theory. If he *intentionally* considered the corn-ratio theory as the general principle which regulates the profit rate, he would not have assumed input composed of the non-homogeneous commodities, and he would have *always* illustrated the rate of profit in agriculture as the ratio of physical quantities and regulating the profits of all other trades. The example cited by de Vivo happens to be a coincidence.

De Vivo (2000) also argues that by about 1831, 'parallel to his (tacit) abandonment of the theory of profits based on assumptions of homogeneity between capital and product, he also abandoned his so-called "capital theory of value", and fell back on the labour theory of value' (pp. 700-1). Nevertheless, about Torrens' theory of profit in his *On Wages and Combination* published in 1834, de Vivo contradicts himself, stating: 'Here Torrens is still employing the corn-ratio theory, to determine the rate of profits' (de Vivo 2000, p. ii).

From these considerations, it is obvious that 'in his chapter upon the profits of stock' in the second edition of his *External Corn Trade* Torrens does not put forward a corn-ratio theory of profits. I therefore also contend that it is hard to argue that Torrens was indebted to Ricardo's *Essay* for a corn-ratio theory and, for this reason, that such a link may not be used as definitive 'further evidence' in favour of Sraffa's interpretation of Ricardo's early theory of profit.

#### 4 Conclusion

In Torrens' theory of profit there are illustrations with the profit rate appearing as the ratio of physical quantities and others with the rate of profit being dependent on prices. The latter involves the former: the former is applicable only when the proportion in which the commodities are produced is equal to that in which they are advanced, while the latter is applicable to any case irrelevant to such proportion. Thus the determination of a profit rate dependent on prices can be considered to be

the original theory of Torrens. Although Torrens' account of the profit rate appears as the ratio of physical quantities in some cases, they do not consist in his general theory of profit and, thus, cannot be regarded as an immediate preceding theory of Sraffa's idea of the 'Standard System'. Nevertheless, Torrens' theory of profit can be considered the germ of Sraffa's theory of the simultaneous determination of interest rate and prices. He conceptualised ideas nearly a hundred years before the next thinker made a contribution to this subject. This is Torrens' greatest contribution to the theory of profit.

Torrens was therefore not an advocate of the corn-ratio theory. At most, for the sake of simplification, he coincidentally made some formulations that are in conformity with a corn-ratio theory. Another conclusion is that Torrens' statement of indebtedness to Ricardo cannot be taken as definitive 'further evidence' in favour of Sraffa's interpretation of Ricardo's early theory of profit.

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## Notes

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2 The parts related to the profit rate (Chapter VII, Part I) remained unchanged from the third edition (1826) to the fifth edition (1829) of the *External Corn Trade*. As mentioned in the introduction, however, I have predominantly used the fifth edition in the construction of this paper.

3 Although Torrens gives this example in Section 2, Chapter VII, Part I of his *External Corn Trade*, he later succinctly explains it in Section 3.

4 In fact, this example is given by Torrens, in order to show that, in the presence of diminishing returns, a rise in the price of agricultural produce leads to a fall in the general rate of profit. It is assumed that in agriculture 300 qr. corn can be raised by expending 100 qr. corn as food and seed plus 50 s. clothing; while in manufacture 150 s. clothing can be fabricated by expending 100 qr. corn as food and seed plus 50 s. clothing. In this case, the price of corn in terms of clothing ( $p_c$ ) and the profit rate ( $r$ ) can be determined by the following system of simultaneous equations:

$$(100p_c + 50)(1 + r) = 300p_c$$

$$(100p_c + 50)(1 + r) = 150.$$

The result  $p_c=0.5$  and  $r=50\%$  can be obtained. Torrens proceeds to suppose that the manufacturing sector remains unaltered and that agricultural produce decreases to only 250 qr. corn in consequence of diminishing returns (see Table 3). Then,  $p_c$  and  $r$  can be determined by the following system of simultaneous equations:

$$(100p_c + 50)(1 + r) = 250p_c$$

$$(100p_c + 50)(1 + r) = 150.$$

The result  $p_c=0.6$  and  $r=36\%$  can be obtained. Hence diminishing returns lead to a rise in the price of agricultural produce (from 0.5 to 0.6), and consequently the general rate of profit must fall (from 50% to 36%).

5 In his theory, Sraffa develops a system of equations that 'contains a number  $k$  of independent equations which determine the  $k - 1$  prices and the rate of profits' (Sraffa 1960, p. 7).

6 Peach (2001, p. 686) successfully reduces de Vivo's argument to four propositions. This paper makes reference to this survey.

7 Peach (2001) strives to confirm that the inspiration for Torrens' own corn-ratio theory came from Ricardo's *Essay* alone by focusing on Torrens' *Letter to Rt Hon the Earl of Liverpool* (1816), in which Torrens inserted the note: 'See a very able and original publication on the Profits of Stock, by D. Ricardo Esq.' (Torrens 1816, p. 30). Peach dwells on the similarities between Ricardo's *Essay* and Torrens' *Letter* in the following passage: 'In both, agricultural capital (and, for that matter, agricultural output) are merely valued in terms of corn/wheat; in both, there is no assumption of physical homogeneity between agricultural product and capital; in both, the consideration of the increase in the corn price occurs only after the analysis of the agricultural sector' (2001, p. 688). He concludes, however, that although 'Torrens had effectively cannibalized the Ricardo analysis', 'it was not a corn model analysis' (*ibid.*).

8 This title is in the 1820 edition of the *External Corn Trade*. Chapter III, Part IV, of the 1820 edition is reproduced with some changes in Chapter VII, 'On the Influence of a free Trade in Corn, upon the Profits of Capital', Part I, of the 1829 edition. Robbins (1958, pp. 269-71) gives a particular account of these revisions.

9 Hollander (1995), contrary to de Vivo, argues: 'That Torrens allows for "material" as well as corn in advances, so that value *is* involved in estimating advances in *corn*, is referred to by de Vivo as a "weakness"... But this surely is another way of admitting that we do *not* have a Sraffa model' (p. 486). And he points out: 'in his text Torrens assumes that the wage in *all* sectors, agriculture included, comprises clothing as well as food' (*ibid.*).

10 Conversely, the rate of profit can be calculated in the following way:

$$r = \frac{450 - 200}{200} = \frac{225 - 100}{100} = 125\%.$$

Corn and clothing are produced in the proportion, 450:225, by expending corn and clothing in the proportion, 200:100. Then the composite commodity is made up in the proportion 2 qr. corn:1 s. clothing.

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