Graz Economics Papers – GEP

GEP 2014–02

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February 2014

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Abstract

In an influential paper entitled “David Ricardo’s Discovery of Comparative Advantage”, which was published in HOPE (Vol. 34, 2002), Roy J. Ruffin attempted to reconstruct the circumstances of Ricardo’s discovery of the law of comparative advantage. Ruffin’s article has inspired a number of further contributions (see, e.g., Aldrich 2004, Maneschi 2004, 2008, Ruffin 2005, Morales-Meoqui 2011) on the precise nature, logical structure, and analytical significance of Ricardo’s formulation of the law of comparative advantage in international trade theory.

The present paper shows that Ruffin’s reconstruction of Ricardo’s discovery of the law of comparative advantage, and in particular his interpretation of Ricardo’s letters to Malthus and James Mill of October 1816, encounters a number of serious problems. When the context of Ricardo’s statements is properly taken into account, and the premises and implications of Ruffin’s hypothesis, according to which those statements refer to international prices, are carefully scrutinized, his novel interpretation is seen to lack plausibility. Moreover, it is shown that Ruffin’s contention that modeling assumptions and analytical results of neoclassical trade theory such as “factor price equalization”, the “Lerner symmetry theorem”, or the “Stolper-Samuelson theorem” can be discerned in Ricardo’s chapter “On Foreign Trade” cannot be sustained.

Key words: Comparative Advantage, David Ricardo, Piero Sraffa

Ricardo's Discovery of Comparative Advantage Revisited

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1. Introduction

In a paper entitled "David Ricardo's Discovery of Comparative Advantage", which was published in this journal, Roy J. Ruffin (2002) attempted to reconstruct the circumstances in which Ricardo discovered the law of comparative advantage and the thought processes that this involved. From circumstantial evidence, and in particular from statements of Ricardo in three letters to Malthus and James Mill, Ruffin inferred that Ricardo 'probably discovered the law of comparative advantage around the first two weeks of October 1816. The date itself is not important, but his letters at the time reveal how Ricardo's mind worked when he discovered the law. If my hypothesis is correct, the letters show that his mind ranged over much of the terrain of trade theory – from factor price equalization conditions to the Ricardian model' (2002: 727). Since Piero Sraffa, the editor of Ricardo's *Works and Correspondence*, had suggested a different reading of the relevant passages in Ricardo's three letters of 5, 11, and 14 October 1816 in his "Introduction" to the *Principles*,[1] Ruffin's contention amounts in effect to charging Sraffa with misinterpretation: 'The reason that other scholars failed to note the importance of the October letters is that they were thrown off the track by a red herring' (2002: 737).[2]

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A previous version of this paper was presented at the conference "New developments on Ricardo and the Ricardian traditions", 9-12 September 2013, in Lyon, France. I should like to thank the participants of this conference as well as Tony Aspromourgos, Heinz D. Kurz, Arrigo Opocher, Sergio Parrinello, and Richard van den Berg for helpful comments and suggestions without of course implicating them in the final result.

[1] See Sraffa (1951: xv-xvi).

[2] Ruffin carefully avoids an explicit statement charging Sraffa with misinterpretation, but he clearly insinuates this. In a footnote, he even seeks to guard himself by stating that 'Sraffa's conjecture … has enough plausibility to prevent conviction in a court of law!' (2002: 741 n).

The present paper will show that Ruffin's reconstruction of Ricardo's discovery of the law of comparative advantage, and in particular his interpretation of the statements in Ricardo's three letters of October 1816, encounters a number of serious problems. When the context of Ricardo's statements is properly taken into account, and the premises and implications of Ruffin's hypothesis, according to which those statements refer to international prices and international trade, are carefully scrutinized, his novel interpretation is seen to lack plausibility.

Ruffin's paper opens with 'a modern statement of Ricardo's law of comparative advantage' in terms of a "two countries–two commodities–one factor" model (i.e., the so-called "2-2-1" model), which is seriously misleading – and which has also misled Ruffin. He knows of course that the so-called "Ricardian" trade model of modern textbooks, in which commodities are supposed to be produced under constant returns by means of a single factor, labor, is not a faithful representation of Ricardo's argument. However, he employs this model not only in refuting misinterpretations of Ricardo's exposition of the law of comparative advantage by 'leading modern interpreters' (2002: 729), but also in support of his own conjectures about the circumstances of its discovery. These conjectures, which concern the "mental processes" by which Ricardo allegedly arrived at the law, were summarized by him in a subsequent paper, also published in this journal, in the following terms:

> In Ruffin 2002, … I showed that Ricardo … was confronted with a contradiction between his labor theory of value and the fact that exports did not necessarily contain the same quantity of labor in the home country as the amount of labor in the foreign country embodied in a country's imports. … Apparently, to save his labor theory of value, Ricardo … had to assume that labor is immobile between countries. (2005: 719)

The present paper will show that this account of the thought processes by which Ricardo is taken to have arrived at the formulation of the comparative advantage theory does not stand up to close scrutiny.

Before I turn to these issues, it needs to be emphasized that Ruffin's paper has great merit in clarifying the true meaning of the "four magic numbers" in Ricardo's famous numerical example of England and Portugal trading wine and cloth with each other. As Ruffin correctly pointed out, Ricardo's four numbers refer to the amounts of labor embodied in the unspecified quantities of goods *actually traded* between the two countries – and not to unit labor requirements, as is still widely believed (and frequently asserted in textbooks on international trade theory). Admittedly, Ruffin has not been the first to point this out: The same reading of Ricardo's four numbers had already been suggested by Piero Sraffa (of all people) in his little-known article "An alleged correction of Ricardo" (1930),[3] but Sraffa's hint has apparently been overlooked for several decades by almost all scholars of Ricardo's theory of international trade.[4]

In his famous numerical example Ricardo starts out from a situation of balanced trade, so that the (commodity) terms of trade are effectively treated as given. This implies, as Ruffin (2002: 741, note 15) rightly noted, that the charge of logical incompleteness in Ricardo's exposition of the law of comparative advantage, first raised by Chipman (1965: 479) and since then shared widely among modern interpreters, is not justified. Some further implications that follow from the correct reading of Ricardo's numerical example were spelt out by Maneschi (2004, 2008), who has shown that Ricardo could correctly determine the gains which each country reaps from trade by simply subtracting two of the four numbers, and that non-constant returns in the production of the traded commodities and incomplete specialization are compatible with Ricardo's exposition.[5]

Unfortunately, Ruffin's correct insight regarding the true meaning of Ricardo's numerical example is blurred by the fact that he also tries to read into Ricardo's text what is not really there to be found, namely modeling assumptions and analytical results of modern neoclassical trade theory. Thus Ruffin not only assumes, like many modern trade theorists, that Ricardo's exposition of comparative advantage presupposes a "one-factor model",[6] but he also means to

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[3] In his 1930 paper, Sraffa corrected Einaudi's account, according to which Ricardo's exposition of the law of comparative advantage contained an error in the attribution of the gains from trade (see Einaudi 1929).

[4] See, however, Parrinello (1988) for an exposition of Ricardo's theory of comparative advantage in which the numbers are not interpreted as unit labour requirements, and constant returns to scale are not assumed. Interestingly, Schumpeter (1954: 607) also noted that the numbers refer to the amounts of labour embodied in unspecified quantities of commodities, but failed to see that these are the quantities actually traded, so that the terms of trade are not indeterminate, but given.

[5] Ruffin's 2002 paper has led to a number of further contributions, in which Ricardo's contribution to international trade theory has been re-examined, including Aldrich (2004), Ruffin (2005), Maneschi (2004, 2008), and Morales-Meoqui (2011).

[6] In modern textbooks the representation of the so-called "Ricardian" trade model in terms of a "one-factor" model, which was first proposed by Haberler (1930), is often used to emphasize the contrast with "Heckscher-Ohlin" models, in which comparative advantages

have discerned elements of the "factor price equalization theorem", the "Stolper-Samuelson theorem", and the "Lerner symmetry theorem" in Ricardo's texts (2002: 737, 739, 744). The present paper will therefore pursue two different, though partly interrelated, aims. Its first objective is to show that Ruffin's interpretation of Ricardo's statements in his letters of October 1816, as referring to international prices and international trade, cannot be sustained. The second purpose is to clarify the analytical differences between the now dominant neoclassical approach to international trade theory and Ricardo's classical approach.

The structure of the paper is the following. In Section 2, it is shown that Ruffin's reconstruction of the thought processes involved in Ricardo's discovery of comparative advantage is based on the modern re-statement of Ricardo's trade theory in terms of a "two countries–two commodities–one factor" model. I shall argue that this model is an inappropriate basis for an attempt to reconstruct Ricardo's discovery of the comparative advantage theory, because it neglects that Ricardo had envisioned relative prices, and in particular international prices, as being dependent on the (country-specific) distribution of income between wages, profits, and rents. In Section 3, I then show that Ruffin's interpretation of the relevant passages in Ricardo's three letters of October 1816 encounters logical problems, apart from being contradicted by textual evidence. Section 4 summarizes the argument.

2. The 'modern statement' of Ricardo's law of comparative advantage and its role in Ruffin's reconstruction

Ruffin's proposed reconstruction of Ricardo's discovery of the law of comparative advantage is based on a mixed set of arguments, combining novel textual interpretations, circumstantial evidence, and logical implications that allegedly follow from Ricardo's exposition of the law. In the following, I shall first concentrate on the deficits of the "Ricardian" trade model, which Ruffin presents in the second section of his paper (2002: 729-31), for a proper reconstruction of Ricardo's theory of trade.

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derive from international differences in the countries' relative endowments *with several factors*.

2.1 The modern statement of Ricardo's law of comparative advantage

Ruffin's paper opens with a 'modern statement' of the law of comparative advantage,[7] which he then employs to show that Ricardo's own exposition was quite different. In this context, Ruffin argues persuasively that their reliance on such a modern version has misled 'leading modern interpreters into unjustified claims of logical incompleteness' in Ricardo's argument (2002: 729). But his 'rational reconstruction' of Ricardo's foreign trade theory in terms of a "one-factor" model has also misled Ruffin himself into misunderstandings and/or misinterpretations of various passages in Ricardo's letters and writings, as well as into giving undue weight to the labor theory of value.

For my present purpose, it suffices to provide a brief sketch of the model and to draw attention to only some of its features. Consider, then, two countries, home and foreign, that produce goods 1 and 2. Each unit of good i $(i = 1,2)$ requires a_i (a_i^*) units of homogenous labor in the home (foreign) country. Labor can move freely between industries but not between countries. Therefore, wage rates w and w^* are uniform across industries within each country but not across countries. Assume that $a_i < a_i^*$ and $a_1/a_2 < a_1^*/a_2^*$. Then relative prices in autarky are proportional to relative labor contents, and commodity 1 is relatively cheaper in the home country. When a world market is established, prices must be the same everywhere (ignoring transport costs), both countries are completely specialized, and the international price ratio must lie in the range

$$\frac{\mathrm{a}_1}{\mathrm{a}_2} \leq \frac{\mathrm{p}_1}{\mathrm{p}_2} \leq \frac{\mathrm{a}_1^*}{\mathrm{a}_2^*}$$

Because of $p_1 = wa_1$ and $p_2 = w^* a_2^*$, this inequality can be rewritten as

$$\frac{a_2^*}{a_2} \leq \frac{w}{w^*} \leq \frac{a_1^*}{a_1}$$

In his exposition of the model, Ruffin draws attention to the fact that the ratio of with-trade prices 'is affected by relative wage rates between two types of labor, home and foreign' (2002: 730). He then wonders – apparently forgetting that this "result" was not expounded by

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[7] Ruffin's 'modern statement' formulation is essentially identical with presentations of the so-called "Ricardo model" in modern textbooks on international trade theory, such as Krugman/Obstfeld/Melitz (2009: Chap. 3). The basic elements and analytical features of this formulation derive from Haberler (1930).

Ricardo in the chapter "On foreign trade", but derives from his own rational reconstruction of the latter's argument in terms of a "one-factor" model – why Ricardo 'did not apply this result in chapter 1 of his *Principles* …, in which he dealt with the question of different types of labor' (2002: 730). And some ten pages further down Ruffin then presents the fact that Ricardo allegedly did not apply this "result" in the chapter "On value" as circumstantial evidence which strongly supports his hypothesis that 'the problem he [Ricardo] was working on [in the first two weeks of October 1816] almost surely was comparative advantage. The most reasonable assumption is that when he wrote chapter 1 he had not worked out the law of comparative advantage because of his statement about relative prices and relative wages' (2002: 740). This whole line of argument is inconclusive, for two main reasons.

Firstly, it is inconclusive because Ruffin's contention is simply wrong that Ricardo had not acknowledged, in chapter 1 of the *Principles*, that relative prices are affected by relative wages for different types of labor. In section 2 of chapter 1 of the *Principles* (I: 20-22) Ricardo had of course not suggested, as Ruffin seems to suppose, that relative prices are unaffected by the existence of wage differentials for different types of labor, but rather that those wage differentials remain fairly stable over time and therefore are 'no cause *of variation* in the relative value of commodities' (I: 20, emphasis added).[8] Ruffin's hypothesis that Ricardo had been unaware of the impact of relative wages on relative prices when he wrote chapter 1, and only learned of this "result" when working on chapter 7, is simply false.

Secondly, and more importantly, Ruffin's line of argument is also inconclusive because Ricardo's exposition of the law of comparative advantage was not based on a "one-factor" model, and accordingly his concern in chapter 7 was not primarily with wage differentials, but rather with international *profit rate differentials*. (Textual evidence for this claim is provided below, in Section 2.2.) Ricardo's concern with international profit rate differentials obviously implies that a proper reconstruction of the foreign trade model underlying his argument must, besides wages and labor, also take into account profits and capital. Moreover, such a reconstruction cannot ignore the fact that the rate of profits was envisaged by Ricardo as being determined first and foremost by the production conditions of "corn" at the agricultural margin, because he supposed "corn" to be strictly required for the workers' subsistence. For a proper 'modern statement' of Ricardo's trade model commodities must therefore be divided

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[8] For an analytical treatment of persistent wage differentials in a classical framework and a summary account of Ricardo's (and Smith's and Marx's) treatment of heterogeneous labor, see Kurz and Salvadori (1995, chap. 11).

into necessaries and luxuries. This implies, firstly, that a model which is meant to be a faithful representation of Ricardo's numerical example must comprise at least three commodities: Apart from the two traded goods, "cloth" and "wine", which Ricardo treated as luxuries, "corn" must be introduced as a necessary wage good which is produced under diminishing returns.[9] Secondly, such a model cannot ignore that Ricardo's treatment of labor was significantly different from the modern one. In the textbook Ricardian trade model, where labor is the only factor of production and the entire income consists of wages, the level of real wages depends on the productivity of labor in the production of the two traded commodities. Ricardo, however, conceived of labor as a resource that is available in unlimited amounts for a certain quantity of corn (and other necessaries), that is, at a *given* subsistence wage.

The following sketch of a model is meant to capture these important aspects of Ricardo's trade theory. Suppose two countries, home and foreign, which produce three commodities, "corn", 1 and 2. The given subsistence requirements of corn are $d_c(d_c^*)$, so that we must have

$$w = p_c d_c, \quad \text{and} \quad w^* = p_c^* d_c^* . \tag{1}$$

Wages are advanced at the beginning of the single production period, which is the same for all commodities. For simplicity, wages are assumed to be the only capital advances, so that commodities are produced by 'unassisted labor' alone.[10] Then, the price of corn in home and foreign is determined as

$$p_c = a_c(x_c)w(1+r), \qquad \text{and} \qquad p_c^* = a_c^*(x_c^*)w^*(1+r^*), \tag{2}$$

where $a_c(x_c)$ and $a_c^*(x_c^*)$ are the unit labor requirements, which are not constant but depend on the total quantities of corn produced in each of the two countries. Similarly, $a_i\,(x_i)$ and $a_i^*(x_i^*)$ denote unit labor requirements of commodities *i*, which also depend on the quantities produced. The labor input coefficients in corn production are supposed to be strictly increasing functions of the amounts of corn produced, whereas the functional relationship

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9 See also Walsh (1979).

10 The model thus ignores the existence of produced means of production and/or of wages that are advanced over differing production periods for different commodities. For an analysis in which these elements are taken into account, see Metcalfe and Steedman ([1973] 1979). The above formulation allows us to follow Ricardo, who explicitly considered these elements in chapter 1 of the *Principles*, but then ignored them in the following chapters by supposing for simplicity that the relative values of commodities are governed by their relative labor contents.

between the unit labor input requirements and the amounts produced of commodities 1 and 2 could be constant, rising, or falling. (In the latter case, increasing returns must be supposed to arise from firm-external economies.) The prices of commodities 1 and 2 in home and foreign are then given by

(3) $p_1 = a_1(x_1)w(1+r)$, $p_2 = a_2(x_2)w(1+r)$,

$p_1^* = a_1^*(x_1^*)w^*(1+r^*)$, and $p_2^* = a_2^*(x_2^*)w^*(1+r^*)$.

Of course, w (w^*) varies with the amount of corn produced, that is, with x_c (x_c^*), since p_c (p_c^*) varies with it. Note that from eqs (1) and (2) the rate of profit r (r^*) is fully determined for each level of x_c (x_c^*) in each of the two countries.

This brief sketch suffices for my present purpose, which is to highlight some of the major differences between the so-called "Ricardian" trade model of modern textbooks (which Ruffin designated as a "modern statement" of the comparative advantage theory) and Ricardo's model of foreign trade. As we saw above, in the "single-factor" model, where the entire income consists of wages, the high-productivity country must always exhibit a higher real wage rate than the low-productivity country, both before and after trade. In Ricardo's world, things are invariably more complicated, for several reasons.

For Ricardo it is perfectly possible, for example, that the country which has an absolute *dis*advantage in the production of cloth and wine, but a comparative advantage in the production of cloth, could exhibit the same real wage as the other country and a *higher* rate of profits in the no-trade situation. The reason for this is that Ricardo considered the real wage as being determined by the production conditions of corn alone, so that the rate of profits is always higher in that country in which 'corn could be grown with less labour [at the agricultural margin]' (I: 136 n.). Moreover, foreign trade cannot raise the rate of profits unless it lowers the money wage, that is, unless the imported commodity enters into the workers' wage basket as a strict necessity. The import of wine into England therefore only increases 'the amount and variety on which revenue may be expended, [but] … has no tendency to raise the profits of stock' (I: 133).

A misunderstanding which also derives from the fact that Ruffin in effect persists in ascribing a "one-factor" model to Ricardo, is the view that England, having an absolute disadvantage in the production of both commodities, is the "backward country", and Portugal is the "advanced country". This reading overlooks that in the passage which immediately precedes the numerical example Ricardo had observed:

> [If] in consequence of the diminished rate of production in the lands of England, from the increase of capital and population, wages should rise, and profits fall, it would not follow that capital and population would necessarily move from England to Holland, or Spain, or Russia, where profits might be higher. (I: 134)

As Negishi has rightly pointed out, 'it is quite natural for Ricardo to assume a lower labor productivity in England, i.e., *in an advanced country*: … Labor productivity in England is lower both in cloth and in wine than that in Portugal, because English lands are more densely populated and more heavily invested than Portuguese lands' (1982: 205; emphasis added). This reading is confirmed by other statements in chapter 7, in which England is invariably treated as the world's most advanced manufacturing country, while Poland and America are considered as countries with an abundance of fertile land. The most explicit statement to this effect is contained in the following passage:

> Under a system of perfectly free commerce, each country naturally devotes its capital and labour to such employments as are most beneficial to each. This pursuit of individual advantage is admirably connected with the universal good of the whole. (…) It is this principle which determines that wine shall be made in France and Portugal, that corn shall be grown in America and Poland, and that hardware and other goods shall be manufactured in England. (I: 133-4)

2.2 Labor immobility a "key assumption"?

In Ruffin's interpretation, the problem that troubled Ricardo in the autumn of 1816 was that a country's exports did not necessarily contain the same quantity of (domestic) labor as the amount of (foreign) labor embodied in its imports. According to Ruffin, Ricardo was finally able to "solve" this problem (after a two-week period of intense intellectual effort in early October, reflected in his letters) by introducing the assumption of factor immobility.[11]

[11] According to Ruffin, 'the hard part of his [Ricardo's] discovery was coming up with the key assumption of factor immobility' (2002: 727, 743).

Ruffin stresses the importance of this assumption and observes, quite rightly, that Ricardo's exposition of the law of comparative advantage in terms of the famous numerical example 'is actually introduced by a 192-word treatment of factor immobility and capped by another 293-word analysis of factor immobility' (2002: 743). According to Ruffin, the two passages which "sandwich" the famous numerical example contain 'the key assumption that labor cannot move from England to Portugal' (2002: 743). Why Ruffin considers this assumption "key" is concisely stated by him in his 2005 paper, where he summarized his earlier contribution in these terms:

> In Ruffin 2002, … I showed that Ricardo adopted the labor theory of value in March 1816 and developed the law of comparative advantage in October 1816, when, in writing the chapter on foreign trade in *On the Principles of Political Economy and Taxation*, he was confronted with a contradiction between his labor theory of value and the fact that exports did not necessarily contain the same quantity of labor in the home country as the amount of labor in the foreign country embodied in a country's imports. … Apparently, to save his labor theory of value, Ricardo … had to assume that labor is immobile between countries. (2005: 719)

This passage embodies some rather perplexing statements, which derive from several misconceptions. The first thing to note is that the final statement makes no sense, because the assumption that labor is internationally immobile clearly contributes nothing to a 'saving' of the labor theory of value, since it implies that the ratio of international prices deviates from relative labor contents. Secondly, it needs to be stressed that Ruffin's claim is simply false that in the two passages under consideration Ricardo was assuming the international immobility *of labor.* Scrutiny of the relevant passages shows that Ricardo, characteristically, was referring first and foremost to *capital immobility*:

> If the profits of capital employed in Yorkshire, should exceed those of capital employed in London, capital would speedily move from London to Yorkshire, and an equality of profits would be effected; but if in consequence of the diminished rate of production in the lands of England, from the increase of capital and population, wages should rise, and profits fall, *it would not follow that capital and population would necessarily move from England to Holland, or Spain, or Russia, where profits might be higher*. (I: 134)

Note that Ricardo refers only to *international profit rate differentials*, but makes no mention of wage differentials. This is because he supposes that the increase of capital and population in England is associated with a fall in the rate of profits (and an increase in rents), while raising only money wages without altering the subsistence wage. International wage differentials also play no role in the explanation he gives for the "unequal exchange" of labor that occurs in the cloth and wine example:

> The labour of 100 Englishmen cannot be given for that of 80 Englishmen, but the produce of the labour of 100 Englishmen may be given for the produce of the labour of 80 Portuguese, 60 Russians, or 120 East Indians. The difference in this respect, between a single country and many, is easily accounted for, *by considering the difficulty with which capital moves from one country to another, to seek a more profitable employment*, and the activity with which it invariably passes from one province to another in the same country. (I: 135-6; emphasis added)

He continues: 'It would undoubtedly be advantageous to the capitalists of England, and to the consumers in both countries, that under such circumstances, the wine and cloth should both be made in Portugal, and therefore that the capital and labour of England employed in making cloth, should be removed to Portugal for that purpose' (I: 136). Removed by whom? According to Ricardo, the removal of capital and labor would be advantageous to 'the *capitalists* of England' (and to the consumers of both countries), but there is no incentive for English workers to move, because the level of real wages in the two countries might be the same (or it might even be lower in Portugal than in England). In fact, Ricardo did not consider it necessary to provide any explanation for international immobility of labor, while he explicitly justified the assumption of *immobility of capital*, in the following terms:

> Experience, however, shews, that the fancied or real insecurity of capital, when not under the immediate control of its owner, together with the natural disinclination which every man has to quit the country of his birth and connexions, and intrust himself with all his habits fixed, to a strange government and new laws, *check the emigration of capital*. These feelings, which I should be sorry to see weakened, induce most *men of property* to be satisfied with a low rate of profits in their own country, rather than seek a more advantageous employment for their wealth in foreign nations. (I: 136-7; emphases added)

Note that in this passage Ricardo refers to the 'emigration of capital' and to the natural disinclination of 'men of property' to quit their home country – not to any motives which might discourage workers from migrating. For Ricardo, the existence of comparative cost advantages provides no incentives for English workers to migrate; it is the capitalists only who could benefit by 'removing capital *and labour'* from England to Portugal.[12] Even at the domestic level, where he supposed labor and capital to be fully mobile, Ricardo seems not to have conceived of workers as actively migrating from one industry to another. He rather envisaged intersectoral re-allocations of capital and labor as being guided primarily by the capitalists' decisions. For him, it is 'the manufacturers' who, in their constant search for higher profitability, 'are removing their capitals, *and the labour which they can command*, from one employment to another' (I: 262; emphasis added).

It should be noted that it would of course be no answer to my objection to his argument, if Ruffin were to suggest that the "key assumption" was 'factor immobility' rather than labor immobility, and that his argument remains valid if the latter is simply replaced by 'capital immobility'. For it must be obvious to anyone who has studied chapter 1 of the *Principles* that Ricardo was clear about the fact that relative prices cannot possibly be proportional to relative amounts of labor embodied when differing levels of the rate of profit are used in calculating the prices of different commodities.

Before we proceed to examine Ruffin's novel interpretation of Ricardo's three letters, we must briefly dispose of an argument which has been put forward by Andrea Maneschi in support of Ruffin's interpretation. Maneschi maintained that

> Ruffin argues persuasively that Ricardo's primary concern … was not how the commodity terms of trade are determined, but the fact that the double factoral terms of trade[13] between two trading countries are usually not equal to unity. While it is theoretically possible (though unlikely) that they equal unity when each country has an absolute advantage in its export commodity, this is impossible when (as in Ricardo's

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[12] John Stuart Mill similarly argued that the inapplicability of the law of value in international exchange derives from the fact that 'men do not usually leave their country, or even send their capital abroad, for the sake of those small differences of profit which are sufficient to determine their choice of a business, or of an investment, in their own country and neighbourhood' ([1844] 1967: 237).

[13] The concept of "double factoral terms of trade" was introduced by Viner, who defined it as 'the number of units of the productive services of the foreign country whose product exchanged for the product of one unit of the productive services of your own country' (1937: 561). With labor as the only factor, "double factoral terms of trade" which are equal to unity mean that one unit of domestic labor exchanges, through trade, for one unit of foreign labor.

> numerical example) Portugal has an absolute advantage in both commodities. Hence the labor theory of value cannot be relied on as a guide for the determination of international values. (2004: 17, note 2)

This argument suggests that Ruffin's contention, according to which Ricardo originally believed in the applicability of the labor theory of value to international values, is perhaps not so implausible, because it is 'theoretically possible' to reconcile this belief with trade based on absolute advantages (while trade based on comparative advantages could not possibly be fitted together with this belief on logical grounds). But the support which can be derived from this argument for Ruffin's hypothesis is indeed rather weak, because it is only in very exceptional cases that the commodity exchange based on absolute advantages takes place at double-factoral terms of trade which are equal to unity.

3. Ruffin's interpretation of Ricardo's three letters

We now turn to Ruffin's novel interpretation of Ricardo's statements in his letters of 5, 11, and 14 October 1816. In Ruffin's view, these letters 'show a two-week period of great and sustained mental effort … to the point of Ricardo's being uncharacteristically forgetful during the writing of his chapter on foreign trade' (2005: 719). Unlike in Ruffin (2002: 737-40), the three letters are here discussed in chronological order.

3.1 Ricardo's letter to Malthus of 5 October 1816

Ruffin contends that the following passage in Ricardo's letter to Malthus of 5 October 1816 refers to international prices and comparative advantage:

> I have been very much impeded by the question of price and value, my former ideas on those points not being correct. My present view may be equally faulty, for it leads to conclusions at variance with all my preconceived opinions. (VII: 71-2)

There are several facts which are difficult to reconcile with Ruffin's novel interpretation. First, the context in which this passage occurs is clearly unrelated to foreign trade and international prices. The full paragraph in Ricardo's letter, from which this passage has been excerpted, reads as follows:

> I hope your additional volume[14] will soon follow your new edition of the old work[15]. I shall be glad to see in a connected form your matured opinions on the progress of rent, profits, and wages, and in what manner they are affected by the increasing difficulty of procuring food, by the increase of capital, and the improvement of machinery. I fear we shall not agree on these subjects, and I should be very glad if we could fairly submit our different views to the public, that we might have some able heads engaged in considering it. Of this however I have little hope for though I feel strongly the truth of my theory I cannot succeed in stating it clearly. *I have been very much impeded by the question of price and value, my former ideas on those points not being correct. My present view may be equally faulty, for it leads to conclusions at variance with all my preconceived opinions.* I shall continue to work, if only for my own satisfaction, till I have given my theory a consistent form. (VII: 71-2; italics added)

Ricardo's concern in this paragraph is clearly and unambiguously with what he calls 'my theory' of the progress of rent, profits, and wages, as opposed to Malthus's 'matured opinions' on the same subject. The passage quoted by Ruffin (given in italics above) is directly related to the preceding sentence, in which Ricardo states that he 'cannot succeed in stating it clearly', where 'it' clearly refers to his theory of the progress of rent, profits, and wages: He had been prevented from stating his theory of income distribution clearly by the fact that he had found his 'former ideas' on the question of price and value to have been erroneous. Ruffin's interpretation of the italicized passage as referring to *international prices* can appear reasonable only when it is completely de-contextualized and quoted in isolation, but must look absurd when the passage is read in its proper context.

Moreover, Ruffin's interpretation also encounters logical difficulties. It implies that Ricardo's allusion to 'my former ideas on those points', which he later found to be erroneous, must refer to the view that international values are governed by the same laws as domestic values, that is, by relative labor contents. And his 'present view' (i.e., that international exchange ratios are *not* governed by relative amounts of embodied labor) would then have caused him such headache, because 'it leads to conclusions at variance with all my preconceived opinions'. Is this conceivable?

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[14] This refers to Malthus's *Principles of Political Economy*.

[15] The reference here is to Malthus's *Essay on Population*.

Let us first investigate whether Ricardo could conceivably have believed, before October 1816, that international exchange ratios are governed by relative amounts of labor embodied. There is no direct textual evidence which shows conclusively that he did, or did not, hold such a view. However, some indirect textual evidence can be provided to show that Ricardo cannot possibly have held this view. We can refer again to the passage already quoted above, in which Ricardo explains that 'the labour of 100 Englishmen cannot be given for that of 80 Englishmen, but the produce of the labour of 100 Englishmen may be given for the produce of the labour of 80 Portuguese, 60 Russians, or 120 East Indians' and states that '[the] difference in this respect, between a single country and many, *is easily accounted for*' by the persistence of international profit rate differentials under incomplete international capital immobility (I: 135; emphases added).

Let us turn, then, to the second implication of Ruffin's interpretation, namely, that Ricardo was referring to the proposition that international price ratios, unlike domestic ones, are *not* governed by relative labor contents, because labor immobility between countries prevents the equalization of international wage rates, when he wrote to Mill that his 'present view may be equally faulty, for it leads to conclusions at variance with all my preconceived opinions'. Why should this insight be at variance with 'all' (or any) of Ricardo's 'preconceived opinions', given that he had fully acknowledged in section 2 of Chap. 1 that wage rate differentials for different types of labor must affect relative prices?

3.2 Ricardo's letter to Malthus of 11 October 1816

In support of his proposed reconstruction Ruffin also provides a quotation from Ricardo's letter to Malthus of 11 October 1816, which, he contends, 'supports the interpretation that Ricardo was working out comparative advantage' in this period (2002: 739). Ruffin's reference is to the following passage:

> What would you say of two countries in which there are precisely equal capitals,– where wages are also equal, and where the population is precisely in the same number? Would the demand compared with the supply of capital be the same in both? If you say they would I ask whether their rate of profits would be the same under any other supposition but that of their land being exactly of the same degree of fertility? *To me it appears quite probable that the ordinary rate of profits might in one be 20 and in the other only 15 pc.*[t] *or in any other proportions*. (VII: 79; italics added)

Interestingly, Ruffin chose to confine his quotation to the three rhetorical questions that Ricardo posed to Malthus, and to omit the final sentence (italicized above). However, the final sentence squarely contradicts his interpretation. In Ruffin's view, the above passage (without the final sentence) 'shows that Ricardo was thinking about factor price equalization at this time' (2002: 739), and he contends: 'This is fortuitous for my hypothesis because chapter 7 *also* discusses factor price equalization conditions in a similar way (I: 142)' (2002: 739). And from the allegedly existing similarities between the two passages in Ricardo's letter and in chapter 7 Ruffin then concludes that Ricardo must have worked on foreign trade in this period, and that,

> in order to figure out comparative advantage, *he* [Ricardo] *may have considered the disparate consequences of completely opposite views of the world, one in which the countries are identical with several factors and one in which they had different technologies and only one factor.* (2002: 739)

In my reading, Ruffin's interpretation is doubly wrong: Neither does the passage in Ricardo's letter to Malthus 'describe a factor price equalization world' nor did Ricardo 'discuss factor price equalization conditions in a similar way' in the relevant passage of the chapter "On foreign trade". (I also reject, of course, Ruffin's view that Ricardo contemplated a world in which countries 'had different technologies and only one factor'.)

Let us first scrutinize the passage in the letter to Malthus of 11 October, reproduced above. In this passage Ricardo's concern is with challenging Malthus's view that the general rate of profits is determined by 'the demand as compared with the supply of capital' by contrasting it with his own theory, according to which the rate of profits depends on the level of proportional wages, which in turn are governed first and foremost by the 'degree of fertility' of the marginal land. For this purpose Ricardo constructs a hypothetical case, in which the difference between his own theory of profits and Malthus's can be presented in the clearest possible light. Under the conditions stated, 'the demand as compared with the supply of capital' would be the same in both countries, so that Malthus would have to conclude that the two countries must exhibit the same rate of profits. This contrasts sharply with Ricardo's claim (which is explicitly spelt out in the final sentence – omitted by Ruffin) that the two countries' rates of profits could very well be quite different if their lands are not exactly of the same degree of fertility. The passage under consideration has nothing to do with "factor price equalization" consequent upon free trade.

We can now move on to the passage in chapter 7 of the *Principles* (I: 142), which according to Ruffin 'discusses factor price equalization conditions in a similar way'. It reads:

> Of two countries having precisely the same population, and the same quantity of land of equal fertility in cultivation, with the same knowledge too of agriculture, the prices of raw produce will be highest in that where the greater skill, and the better machinery is used in the manufacture of exportable commodities. The rate of profits will probably differ but little; for wages, or the real reward of the labourer, may be the same in both; but those wages, as well as raw produce, will be rated higher in money in that country, into which, from the advantages attending their skill and machinery, an abundance of money is imported in exchange for their goods. (I: 142)

Although there are some superficial similarities between this passage and that in the letter to Malthus, there are also important differences. As we saw above, Ricardo's concern in the letter was with discussing Malthus's "demand-and-supply-of-capital" theory of profits. On the contrary, in the passage of chapter 7 his concern is with isolating the monetary causes of differences in the money price of raw produce in the two countries. In order to achieve this, he constructs a hypothetical case in which all "real" causes for different money prices of raw produce are eliminated, so that it is only the inflow of precious metals, in exchange for exported manufactures, which accounts for the higher money price of raw produce, and the associated higher money wage, in the more advanced country. It is interesting to note that the above passage, unlike the one in the Malthus letter, includes among the premises 'the same quantity of land of equal fertility in cultivation', but makes no reference to equal quantities of capital: If two countries have the same population (and therefore the same demand for raw produce), and the same agricultural technology as well as the same quantity of land of equal fertility in cultivation (and therefore the same marginal costs in the production of raw produce), the rate of profits could well be the same (or 'differ but little') in both countries, provided the real wage (that is, 'the real reward of the labourer') is also supposed to be the same. But since the more advanced country exports manufactures and imports gold, the value of money is lower, and money prices and money wages are higher, in this country than in the other. Note that the two countries would exhibit the same rate of profits although the "quantity of capital" employed in each is very different.

3.3 Ricardo's letter to Mill of 14 October 1816

The main piece of evidence put forward by Ruffin in support of his story is Ricardo's letter to James Mill of 14 October 1816 (VII: 82-4), in which he declared to have dispatched his manuscript, which (as we know from Mill's letter of 18 November 1816; see VII: 98-9) contained the first seven chapters of the *Principles*. Ruffin contends that in this letter 'Ricardo almost tells us he has just figured out comparative advantage' (2002: 737). Before we scrutinize Ruffin's interpretation of this letter, it seems useful to recall briefly Sraffa's alternative reading, which is contested by him. In Sraffa's interpretation, Ricardo, when urged by James Mill in mid-August 1816 to send him his papers,

> delayed sending the manuscript for two months, under the pretext that he must copy it out. … The real reason for the delay was that he had "been very much impeded by the question of price and value" [VII: 71] (as he wrote to Malthus), and that (as he informed Mill) he had "been beyond measure puzzled to find out the law of price." [VII: 83] "I found on a reference to figures that my former opinion could not be correct and I was full a fortnight pondering on my difficulty before I knew how to solve it." [VII: 83-4] This important change was evidently connected with the "curious effect" (to which he called Mill's attention in the same letter) of a rise of wages in *lowering* the prices of "those commodities which are chiefly obtained by the aid of machinery and fixed capital" [VII: 82]. (1951: xv-xvi)

Thus, Sraffa related Ricardo's "impediment" and "puzzlement", to which he referred in his letters of 5 and 14 October 1816, to his detection of the "curious effect" which a rise of wages produces on relative prices. Now Ruffin cannot possibly deny, of course, that in the first two paragraphs of the 14 October letter Ricardo refers explicitly to the 'curious effect' (VII: 82). He contends, however, that Ricardo's statement in the fourth paragraph ("I have been beyond measure puzzled to find out the law of price. …") is unrelated to the content of the first two paragraphs, and instead refers to *international* prices. What arguments does he have in support of this hypothesis?

First, he contends that the effect referred to, which is now known as the "Ricardo effect", could not possibly have caused Ricardo so much headaches, because it 'is just a "curious effect" and not one that is "puzzling"' (2002: 738). The reason he gives for this judgment is that the proposition under consideration requires only 'a rather elementary calculation', one that 'would have been obvious to a Ricardo' (2002: 740). Of course, whether one considers a particular proposition "obvious" and "elementary" or "curious" and "puzzling" is partly a matter of individual taste and personal judgment – but must surely depend also on the *meaning* that one attributes to the proposition under consideration. In Ruffin's understanding, the "Ricardo effect" 'arises from the fact that the fraction of labor costs differs among goods; thus, when wages rise, the relative value of goods that are capital-intensive should fall' (2002: 740). And in Ruffin's view it is obvious that 'the Ricardo effect is a crude version of matters that are now included in the famous Stolper-Samuelson theorem' (2002: 737).

These remarks reveal a number of misunderstandings which need to be clarified. First of all, it must be stressed that Ruffin's contention that 'for a Ricardo' the proposition to which he referred in the letter as 'the curious effect' would have been "obvious" and "elementary" is squarely contradicted by Ricardo's own words when he writes to Mill: 'You will see the curious effect which the rise of wages produces on the prices of those commodities which are chiefly obtained by the aid of machinery and fixed capital. I hope you will be able to make out what I have said on that subject, and will give me your well considered opinion *on this difficult point*' (VII: 83; emphasis added).[16] Secondly, Ruffin's belittling of Ricardo's difficulties in coming to grips with this "difficult point" indicates that he is entirely unaware of Ricardo's struggles to free himself from the generally accepted view, handed down by Adam Smith, that a rise of wages must raise the prices of all commodities.[17] Third, and most importantly, Ruffin's remarks also reveal that his own understanding of the so-called "Ricardo effect" is in terms of a simple "two-factor" model, in which "labor" and "capital" are considered as two original factors of production, and that he also attributes such a naïve "two-factor" model to Ricardo. But this overlooks not only that wages were generally treated by Ricardo as part of the advanced capital, but also that he conceived of capital not as an original "factor of production", but as a heterogeneous set of produced means of production. It is therefore by no means a coincidence that he related the "curious effect" to commodities

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[16] That Ricardo considered this finding by no means "obvious" and "elementary" is also sufficiently shown by his statement in chapter 1 of the *Principles* (1st ed.) that '[these] results are of such importance to the science of political economy, yet accord so little with some of its received doctrines, which maintain that every rise in wages is necessarily transferred to the price of commodities, that it may not be superfluous to elucidate the subject still further' (I: 61).

[17] For a comprehensive account of this struggle, see Garegnani (1982).

'which are chiefly obtained by the aid of machinery and fixed capital'– and not to "capital-intensive" goods in general (whatever that is supposed to mean).[18]

Let us return, then, to the passage in the 14 October letter which, Ruffin contends, Sraffa had misinterpreted by relating it to the "curious effect" passage at the beginning of the letter. It reads:

> I have been beyond measure puzzled to find out the law of price. I found on a reference to figures that my former opinion could not be correct and I was full a fortnight pondering on my difficulty before I knew how to solve it. During that time I could not proceed or I should have made greater progress. I shall now consider the subject of taxation. (VII: 83-4)

Ruffin claims that in this passage 'Ricardo had foreign trade in mind, not the Ricardo effect that Sraffa guessed' (2002: 738). Let us suppose for a moment that this was true. Then two implications follow. First, Ricardo's use of the phrase 'to find out the law of price' must then be taken to mean[19] that he was trying to establish 'the law of price' in international trade, that is, to go beyond the negative claim that '[the] same rule that regulates the relative value of commodities in one country, does not regulate the relative value of the commodities exchanged between two or more countries' (I: 133). Secondly, Ricardo's statement that after a strenuous fortnight he finally 'knew how to solve it' must be taken to mean that he believed to have solved *this* problem: to have established 'the law of price' *in international trade*. Now, this brings us to a very interesting substantial issue with regard to the interpretation of Ricardo's chapter "On foreign trade", namely to the question whether or not Ricardo had any rule for the determination of the terms of trade, and if so, what this rule was.

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18 For a more detailed analysis of the meaning and validity of the so-called "Ricardo effect", see Gehrke (2003).

19 Obviously, Ruffin's interpretation of this passage also implies, as he himself notes, that Ricardo's phrase 'my former opinion' must then be taken to refer to the proposition 'that value was *always* [i.e., also in international trade] governed by relative labor costs' (2002: 738; italics added). Since we have already discussed the implausibility of this hypothesis in Section 3.1 above, in relation to Ricardo's letter to Malthus of 5 October 1816, there is no need to repeat it here.

The standard view in the literature, to which Ruffin also seems to subscribe,[20] is that Ricardo had failed to provide a rule for the determination of international values, had supposed an arbitrary distribution of the gains from trade, and had omitted to specify the limits for the terms of trade.[21] This view goes back, of course, to John Stuart Mill, who had suggested in his essay "Of the Laws of Interchange between Nations" that in order to determine the terms of trade 'we must revert to a principle anterior to that of cost of production, and from which this last flows as a consequence,– namely, the principle of demand and supply' ([1844] 1967: 237). With the correct reading of Ricardo's four numbers, however, Mill's view appears to be unfounded. Ruffin notes, quite rightly, that it was Mill who 'was responsible for the rational reconstruction of Ricardo in which the labor cost coefficients were interpreted as the amounts used in a unit of each good produced rather than Ricardo's labor cost of producing the amounts contained in a typical trading bundle' (2002: 742-3).[22] But Ruffin omits to draw from this finding the logical conclusion that Ricardo could perhaps have envisaged a determination of the terms of trade that can do without Mill's 'anterior principle of demand and supply', by directly relating international prices to costs of production.

The terms of trade in Ricardo's numerical example are not arbitrarily given, but rather derive from a price rule, which he stated explicitly in chapter 28 of the *Principles*:[23]

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[20] This is not stated explicitly by Ruffin, but can be inferred from the praise which he showers on J. S. Mill: 'It was John Stuart Mill who gave the analysis of comparative advantage the form that became an engine of analysis for generations to come and the starting point for all further developments in trade theory.' (2002: 742)

[21] With regard to the latter two points, see, for example, Samuel Hollander's assessment: 'Ricardo did not formally specify the limits to the terms of trade, although doubtless it was self-evident that they are determined by the 'internal' commodity exchange rates (relative labour inputs) in his example. Moreover, he failed to justify his assertion that the terms of trade would settle approximately half way between the limiting ratios.' (1979: 464)

[22] Although it was certainly John Stuart Mill's exposition, in his essay of 1844 and in chapter 18 of his *Principles*, which must be held responsible for the dissemination of the erroneous interpretation of Ricardo's four numbers as unit labor requirements, the origin of this misinterpretation seems to have been James Mill's exposition, in the first edition of his *Elements of Political Economy* (1821: 85-6).

[23] See also Negishi (1996b: 98) and Aldrich (2004: 388).

> [It] is the natural price of commodities in the exporting country, which ultimately regulates the prices at which they shall be sold, if they are not the objects of monopoly, in the importing country. (I: 375)

This rule can be exemplified with regard to the wine-and-cloth example, where the terms of trade are determined by the with-trade prices of commodities 1 and 2,

(4) $$p_1^T = a_1(x_1)w(1+r), \quad \text{and} \qquad p_2^T = a_2^*(x_2^*)w^*(1+r^*).$$

In the case contemplated by Ricardo, where the commodities traded are not entering into the workers' wage basket as strict necessities, the four distributive variables w, w^*, r and r^* are determined from eqs (1) and (2) alone, so that the natural prices of commodities 1 and 2 are determined once the quantities produced are known. However, when one of the internationally traded commodities is corn,[24] or when one of the traded commodities (wine, for instance) is supposed to be necessary for the workers' subsistence, eqs (4) are underdetermined, since the with-trade wage rates and the with-trade profit rates in the two countries are no longer determined from eqs (1) and (2) alone.

If Ricardo envisaged a determination of international prices without recourse to reciprocal demands, the question arises how demand changes can be absorbed without altering the terms of trade. A compelling answer, which was first proposed by Negishi ([1996] 2000: 98), is that changes in demands are absorbed by corresponding changes in supplies, and do not induce any price changes unless production costs change as a result of changes in the quantities produced. This is the basic principle of Ricardo's classical approach to the determination of long-period prices:

> It is the cost of production which must ultimately regulate the price of commodities, and not, as has often been said, the proportion between the supply and demand: the proportion between supply and demand may, indeed, for a time, affect the market value of a commodity, until it is supplied in greater or less abundance, according as the

[24] As Ricardo noted, with international trade in corn there need not be complete specialization: 'It will appear then, that a country possessing very considerable advantages in machinery and skill, and which may therefore be enabled to manufacture commodities with much less labour than her neighbors, may, in return for such commodities, import a portion of the corn required for its consumption, even if its lands were more fertile, and corn could be grown with less labour than in the country from which it was imported.' (I: 136, note)

> demand may have increased or diminished; but this effect will be only of a temporary duration. (I: 382)

For Ricardo, this principle remains intact also in open economies with international trade in commodities. For example, if corn is imported into England from France, its price in England, Ricardo contends, is governed by its natural price in France,[25] ‘and it would remain at this price, whether England consumed a hundred thousand, or a million of quarters’ (I: 374-5). But this does not mean that the natural price in France is unaffected by the English demand for corn:

> If the demand of England were for the latter quantity, it is probable that, owing to the necessity under which France would be, of having recourse to land of a worse quality, to furnish this large supply, the natural price would rise in France; and this would of course affect also the price of corn in England. *All I contend for is, that it is the natural price of commodities in the exporting country, which ultimately regulates the prices at which they shall be sold, if they are not the objects of monopoly, in the importing country*. (I: 375; emphasis added)

With international trade in commodities which are produced at non-constant costs, foreign demand can alter the production costs and thus the natural prices, because it alters the total quantities supplied. Therefore, the terms of trade are *not* independent of demand, but the influence of changes in foreign demand is by way of directly affecting the long-period supply prices. Once this is understood, it is also possible to see that the charge commonly leveled at Ricardo of having failed to specify the limits of the terms of trade is unfounded. In my reading, the following passage contains a reasonably precise statement on those limits:[26]

> Cloth cannot be imported into Portugal, unless it sell there for more gold than it cost in the country from which it was imported; and wine cannot be imported into England, unless it will sell for more there than it cost in Portugal. If the trade were purely a trade of barter, it could only continue whilst England could make cloth so cheap as to obtain a greater quantity of wine with a given quantity of labour, by manufacturing cloth than by

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25 Ricardo refers to ‘the natural price, viz. that price which is necessary to its production, and without which it could not be cultivated’ in France; he also refers to it as ‘the price at which it could be furnished to the English market, and afford the usual and ordinary profits of stock in France’ (I: 374).

26 See also Morales-Meoqui (2011: 753).

> growing vines; and also whilst the industry of Portugal were attended by the reverse effects. (I: 137)

This statement, which has generally been read as a vague and insufficiently precise statement on the limits of the terms of trade, is in fact fully satisfactory in view of the premises underlying Ricardo's analysis: With non-constant returns in the production of the traded commodities, a change in the amounts traded will alter the quantities that have to be supplied and thus their production costs. Accordingly, the limits are not given and constant, independently of the terms of trade, but subject to change with changing terms of trade, since the total amounts traded are liable to change with changing terms of trade.

3.4 Further arguments invoked by Ruffin in support of his interpretation

A seemingly very compelling argument invoked by Ruffin in support of his interpretation is the fact that the manuscript which Ricardo dispatched to Mill on 14 October 1816 contained a draft of the first seven chapters of the *Principles,* and that Ricardo had announced in his accompanying letter that he would 'now consider the subject of taxation (VIII: 849). By adopting the plausible assumption that Ricardo had worked on the chapters in the same order in which they appeared in the book, Ruffin (2002: 738) concluded that he must have been engaged in the writing of chapter 7 shortly before he dispatched the manuscript, that is, in the first two weeks of October 1816.

It should be clear that in the preceding discussion it was not necessarily denied that Ricardo might have worked on the chapter on foreign trade in late September or early October 1816. What has been strongly denied is Ruffin's interpretation of the passages in Ricardo's letters to Mill and Malthus, and that Sraffa has been guilty of misinterpretation. Bearing this in mind, we may briefly discuss a further argument put forward by Ruffin. He seeks to establish the correctness of his interpretation by showing the implausibility of an alternative (or – from his perspective – a *counterfactual*) hypothesis:

> If Ricardo was not writing chapter 7 during this two-week period, he then would have to write the chapter on foreign trade earlier and there is no evidence of the intense intellectual effort required to invent comparative advantage in earlier letters. (2002: 740-41 n).

This argument is based on two premises. First, it presupposes that the development of the law of comparative advantage must have required 'an intense intellectual effort', and, secondly, that this effort must be notably reflected in Ricardo's correspondence. There is little point in discussing the second premise (which of course may, but need not necessarily hold true), but a brief discussion of the first one can be of some interest, because it leads us directly into the discussion of alternative interpretations of Ricardo's discovery of the comparative advantage theory. The requirement of an 'intense intellectual effort' for its discovery is, of course, merely Ruffin's contention – one could equally well suggest, as Jacob Viner (1937: 440) has in fact done, that when Ricardo expounded the law of comparative advantage he was merely applying the "eighteenth century rule" and tracing out some of its logical implications.[27] And in following up on Viner's suggestion, one could then also take into account, in a serious attempt to explain the thought processes involved in Ricardo's discovery of comparative advantage, John Chipman's finding that 'lurking in the Gervaise-Hume theory of the international distribution of the precious metals, and brought out quite explicitly by Thornton, is the origin of the theory of comparative advantage' (2008 [1984]: 267 [2]).[28] According to Chipman, 'the law of comparative advantage, as applied to trade in goods and coin' (2008 [1984]: 306) was first expounded by Henry Thornton in 1802, from where it 'was absorbed into Ricardo's early work', that is, into his monetary writings of 1811, in order to be later extended by him 'to the explanation of trade in commodities other than money' in chapter 7 of the *Principles* (2008 [1987]: 217). In Ruffin's attempt to reconstruct the "thought

[27] The "eighteenth century rule" stipulates that it is beneficial for a country to import commodities whenever it can obtain them in exchange for exports whose production entails less real costs compared to the domestic production of the same amount of the imported commodities. According to Viner 'the doctrine of comparative costs is, indeed, but a statement of some of the implications of this rule' (1937: 440). He added: '[The] explicit statement that imports could be profitable even though the commodity imported could be produced at less cost at home than abroad was, it seems to me, the sole addition of consequence which the doctrine of comparative costs made to the eighteenth century rule. Its chief service was to correct the previously prevalent error that under free trade all commodities would necessarily tend to be produced in the locations where their real costs of production were lowest.' (1937: 441) Interestingly, Edgeworth also regarded the comparative cost principle, in its generalized form, as 'obvious': 'Foreign trade would not go on unless it seemed less costly to each of the parties to it to obtain imports in exchange for exports than to produce them at home. This is the generalized statement of the principle of comparative cost, with respect to its positive part at least.' (1925, II: 6)

[28] Chipman briefly expounded this reconstruction in his entry on "International Trade" in the (old) *New Palgrave* (2008b [1987]: 216-7) and in much greater detail in his little-known paper on "Balance-of-Payments Theory from Locke to Ricardo" (2008a [1984]).

processes" involved in Ricardo's discovery of comparative advantage Ricardo's early monetary writings have been ignored without any justification.

It remains for us, then, to correct an interpretative error in the final section of Ruffin's paper, where he showed convincingly, contra Thweatt (1976), that Ricardo had referred to comparative advantage not only in chapter 7 of the *Principles* but in other chapters and writings as well, and also in a letter to McCulloch of 23 March 1823. According to Ruffin, this letter 'shows Ricardo's remarkable quantitative insight that protection to agriculture could keep profits at home higher than abroad' (2002: 745). The relevant passage, Ruffin contends, shows not only

> that Ricardo never gave up on comparative advantage; but it also shows his ability to see the world in more general terms than his simple labor cost view. If two countries have the same commodity prices and the same profit rate, under the conditions postulated by Ricardo the advanced country would specialize in manufacturers [*sic*] and the undeveloped country in corn. If a tariff is imposed on corn, then the rate of profit could be higher in the more advanced country. (2002: 745)

In Ruffin's reading, then, Ricardo anticipated a result of modern trade theory, according to which the imposition of an import tariff could raise the rate of profit in the importing country. This is a further instance of reading into Ricardo's text something that is not really there to be found. In fact, the argument which Ricardo put forward in his letter to McCulloch is simply a corollary of his theory of profits, as it was first expounded in the *Essay on Profits* and then developed further in the *Principles*. This is evident if we look at the passage in Ricardo's letter to McCulloch which Ruffin quoted in support of his interpretation and re-insert the part (in italics) which Ruffin chose to omit:

> I have put the case in my book [1: 136n] of a country having a very little superiority over its neighbours in the production of corn but a very great one in the production of manufactured goods. In such a country, notwithstanding a corn law, profits would be higher than in the neighbouring countries, and consequently no capital would flow from it, *although it should refuse to import cheap corn*. (VIII: 358)

Ricardo's point is that the rate of profits could be higher in England than in the neighboring countries – not *because* a tariff is imposed on corn imports but rather *in spite of the fact* that the corn-laws prohibit the importation of cheap corn. As long as the more advanced country (England) has ‘a very little superiority over its neighbors in the production of corn’, the rate of profits could be higher than abroad, even if she ‘should refuse to import cheap corn’, because the production costs of corn (estimated in terms of the amount of labour required at the agricultural margin) are lower than abroad. Therefore McCulloch’s fear[29] is unfounded that capital, in search of more profitable employment abroad, will necessarily flow out of England whilst the corn laws are in force:

> You infer too strongly I think that profits abroad exceed profits here by the whole difference in the *money price of corn*. My opinion is this – if we were allowed to get corn as cheap as we could get it, by importation, profits would be very considerably higher than they now are; but this is a very different thing from saying that profits are very considerably lower here than abroad. It is quite possible (tho I do not believe it is true) that profits may be higher here than abroad. It is possible that the *labour price of corn* may be cheaper here than in the countries from which we should import corn if trade were free and open. (VIII: 357-8)

Although the *money price of corn* is lower in the neighboring country than in England, the *labour price of corn* might be higher – and if that was indeed the case, the general rate of profits would be lower than in England, so that there is no incentive for moving English capital abroad. This passage shows conclusively that Ricardo was clear about the fact that for corn to be imported into England a higher “labour price” abroad must be associated with a lower money price. The neighboring country has a comparative advantage, but an absolute disadvantage, in the production of corn. Therefore, ‘if trade were free and open’, corn would be imported into England, and this would raise the rate of profits in England. Contrary to Ruffin’s assertion, it is thus not the imposition of a tariff, but rather the removal of trade barriers, which could raise the rate of profit in the more advanced country.

This shows, again, that the relationship between “factor prices” and trade based on comparative advantage is more complicated in Ricardo’s theoretical system than in the simple “one factor” model by which modern trade theorists have tried to capture it.

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[29] See McCulloch’s letter to Ricardo of 13 March 1821 (VIII: 353).

4. Conclusions

In his article on the reconstruction of Ricardo's discovery of comparative advantage Ruffin (2002) has made a most valuable contribution by correcting the common misinterpretation of the four numbers in Ricardo's famous numerical example of England and Portugal trading cloth and wine with each other. The erroneous reading of the four numbers as unit labor requirements, which seems to have been introduced by James and John Stuart Mill in 1821–29, has significantly contributed to the transformation of Ricardo's original formulation of the comparative advantage theory, which was embedded in his classical approach to the theory of value and distribution, into the form it was given a century later by Gottfried Haberler (1930) in terms of the so-called "Ricardian" trade model. Ruffin therefore deserves credit for having resurrected from oblivion Sraffa's earlier statement on the correct reading of Ricardo's four numbers, which was overlooked for several decades. Ricardo's formulation of the law of comparative advantage can now be seen to be compatible with non-constant returns and incomplete specialization, and the charge of logical incompleteness in Ricardo's exposition can be conclusively refuted. Moreover, it can also be appreciated that Ricardo envisaged a determination of the terms of trade without recourse to reciprocal demands, by directly relating international prices to costs of production. It should be pointed out, however, that except in the special case contemplated by Ricardo in his cloth-and-wine example, in which the traded commodities are considered as not entering into the wage basket as strict necessities, the terms of trade cannot be determined independently of, and prior to, the distributive variables in the two countries trading with each other.

On the other hand, however, Ruffin's novel interpretation of Ricardo's statements in his letters of October 1816 does not stand up to close scrutiny nor does his account of the "thought processes" involved in Ricardo's discovery of the law. It is therefore suggested to re-open the discussion on the path by which Ricardo arrived at the law of comparative advantage.

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