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THE DISCOVERY OF COMPARATIVE ADVANTAGE

BY

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I. INTRODUCTION

> Torrens [in 1815] clearly preceded Ricardo [in 1817] in publishing a fairly satisfactory formulation of the doctrine [of comparative costs]. It is unquestionable, however that Ricardo is entitled to the credit for first giving due emphasis to the doctrine, for first placing it an appropriate setting, and for obtaining general acceptance for it by economists.

Thus Jacob Viner (1937, p. 442) balanced the claims of E. R. A. Seligman for Robert Torrens against those of J. H. Hollander for David Ricardo. Lionel Robbins (1958) found rather more in Torrens, and J. Chipman (1965) also made much of his contribution. W. O. Thweatt (1976) made a small sensation when he attributed Ricardo's formulation to James Mill, regarded only as a popularizer of Ricardo's views. Thweatt further argued (1986) that the mistakes in Mill's own book were made by his son, John Stuart Mill. The most recent commentators, Leonard Gomes (1987, pp. 136–44) and Andrea Maneschi (1998, pp. 51–57), incline to the view that comparative advantage was "a case of multiple discovery," as suggested earlier by George. J. Stigler (1980).

I re-examine these issues of formulation, emphasis, etc. extending the window of 1815–17 to take in later writings by Torrens and by Mill *and* son. Questioning the "unquestionable" leads to the conclusion that the achievements of organization and system that Viner ascribed to Ricardo came later. Torrens, Ricardo, and the Mills *all* made contributions to the discovery of comparative advantage, not by a major multiple discovery but through a sequence of insights and arguments. Ricardo developed Torrens's insight, that a country may import corn that is more costly to produce abroad, in the direction of a general demonstration that the law of value for domestic transactions does not hold for international ones. From the demonstration James Mill extracted the principle of comparative advantage and gave it "due emphasis." Torrens had not formulated, nor even grasped the principle, while Ricardo had not appreciated there was a principle worth developing. It was from Mill's *Elements*, and the works that followed, that

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other economists learned the principle. However Mill's clear and emphatic statement of the principle was supported by unsound arguments. These were repaired by his son in an essay published only in 1844. This provided at last an "appropriate setting" for the doctrine, as well as convincing support for Ricardo's original value claim.

The window is also extended in the other direction to an age when, John Mill (1844, p. 233) opined, the "conceptions with regard to the advantage of trade" were "vague and unscientific, if not positively false." Torrens and James Mill were established authors and their pre-*Principles* writings are treated in sections 2–5. Sections 6–9 look at Ricardo and what he was up to if he was *not* "giving due emphasis" to the doctrine of comparative costs. Mill's *Elements* and the effort that went into correcting it are covered in sections 10–14.

I interpret the doctrine of comparative costs, or principle of comparative advantage as a *general* principle on the lines of this from Viner (p. 438):

> if trade is left free each country *in the long run* tends to specialize in the production of and to export those commodities in whose production it enjoys a comparative advantage in terms of real costs, and to obtain by importation those commodities which could be produced at home only at a comparative disadvantage in terms of real costs, and that such specialisation is to the mutual advantage of the countries participating in it.

While the present paper has been winding its way to publication, an important paper on the same subject has appeared, Roy Ruffin's "David Ricardo's Discovery of Comparative Advantage" (2002). The papers may appear to reach quite different conclusions, but there is much common ground and, indeed, my impression is that the results of Ruffin's detailed work on Ricardo's writings can be accommodated within the scheme of the present paper without creating any distress.

II. THE EIGHTEENTH-CENTURY RULE

James Mill (1773–1836) and Robert Torrens (1780–1864) first advanced "conceptions with regard to the advantage of trade" when they wrote against W. Spence's *Britain Independent of Commerce* (1807), a work occasioned by the French blockade of Britain. Spence drew on the Physiocrats (the "economists") for his arguments and, to refute them, Mill and Torrens went back to first principles. Before describing their counter-arguments, it is worth considering what Mill and Torrens had to work with.

Mill and Torrens applied the "eighteenth-century rule"—Viner's (pp. 104–106, 440) name for a principle he spotted in the anonymous *Considerations on the East-India Trade* (p. 583) of 1701.[1] In Viner's (p. 440) paraphrase, "it pays to import commodities from abroad whenever they can be obtained in exchange for exports at a smaller real cost than their production at home would entail." Robbins (1958, p. 22) reckoned it "one-half of the principle of comparative cost."

[1] Now believed to have been written by Henry Martin; see MacLeod (1983) and also Gomes (1987, pp. 98–103).

The principle was available because it appears early in *The Wealth of Nations* (Book I, ch. 2) when Adam Smith (p. 17) describes a person who makes bows and arrows with "more readiness and dexterity" than any other and trades them because "he can in this manner get more cattle and venison than if he himself went to the field to catch them." Later Smith (Book IV, ch. 2, pp. 456–57) moved from the "prudent master of a family" to a "great kingdom," from the observation that "The taylor does not attempt to make his own shoes, but buys them of the shoemaker" to "If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry, employed in a way in which we have some advantage." The "advantage" here is absolute advantage, as in the case of the bow and arrow maker; it may be "natural or acquired" (p. 458).

However eighteenth-century rule and absolute advantage cover rather little of the international economics in *The Wealth of Nations*. Smith (p. 489) developed another notion of advantage based, not on cheapness, but on the income generated by foreign trade. This fits another of his ideas, exporting as a vent for surplus produce:

> When the produce of any particular branch of industry exceeds what the demand of the country requires, the surplus must be sent abroad, and exchanged for something for which there is a demand at home. Without such exportation, a part of the productive labour of the country must cease, and the value of its annual produce diminish (p. 372).

In the *Principles*, Ricardo (p. 291 n.) rejected this argument: "there can never, for any length of time, be a surplus." John Mill's chastening phrase, "vague and unscientific, if not positively false," was directed at Smith. Not everyone agreed: J. R. McCulloch found life in Smith's trade theory even after 1820, as O'Brien (1970, chapter X) shows.

III. THE ECONOMISTS REFUTED

Torrens's reply to Spence was *The Economists Refuted.*[2] There, Torrens described how to measure the "advantage" from trade:

> if I wish to know the extent of the advantage, which arises to England, from her giving France a hundred pounds of broad cloth, in exchange for a hundred pounds of lace, I take the quantity of lace which she has acquired by this transaction, and compare it with the quantity which she might, at the same expense of labour and capital, have acquired by manufacturing it at home. The lace that remains, beyond what the labour and capital employed on the cloth, might have fabricated at home, is the amount of the advantage which England derives from the exchange (1808, p. 37).

Torrens guessed that the exchange of English thick broad cloth for French light broad cloth "augments the productiveness of industry" by no more than three percent but that when England exchanges tin for wine "she obtains a greater quantity of wine by a hundred per cent than if she employed the labour and

[2] For Torrens, Robbins (1958) is indispensable.

capital which procured the tin, to cultivate the grape at home" (p. 38). Taking all industries into account he offered twenty percent as a "rude estimate." Estimating the amount of articles exchanged with foreign countries at £50 million, he put the gain at £10 million.

IV. COMMERCE DEFENDED

James Mill's reply was *Commerce Defended*.[3] This explained that Great Britain imports iron from the Baltic because "we can buy it cheaper abroad, than we can make it at home." This seems to be a price comparison but when he developed the point Mill used a form of corn accounting:

> On making a ton of iron in Great Britain, let us suppose, that the labourers, etc. employed [. . .] have consumed ten quarters of corn. [. . .] Let us suppose, that in the preparation of a certain quantity of British manufactures, nine quarters of corn have been consumed; and let us suppose, that this quantity of goods will purchase in the Baltic a ton of iron, and afford, besides, the expence requisite for importing the iron into Britain. Is there not an evident saving of a quarter of corn, in the acquisition of this ton of iron? Is not the country one quarter of corn the richer, by means of its importation? In the importation of a thousand such tons, is it not a thousand quarters richer? (1808, p. 108).

Mill did not base his estimate of the gain from trade on this reasoning; he (p. 151n) simply took a quarter of the value of British exports £40 million. as a generous estimate of the annual gain, £10 million again.

The arguments of Torrens and Mill are not identical. Mill treats the gain from opening trade, Torrens the loss from closing it; Mill measures the gain by the saving in inputs when the consumption level is given, Torrens the loss in consumption when the input level is given. Mill's genetic account emphasizing the incentive to trade had its dangers: his presentation of the gain, in which British exporters take Baltic prices as given, looks forward to his 1821 presentation of comparative advantage with its famous error while Torrens's presentation looks forward to that in Ricardo's *Principles*—see sections 8 and 10 below. It proved easier to avoid mistakes in treating the effects of terminating a trade that had been going on at specified terms than those of opening trade—for what would the new terms be? Incidentally, the assumption implicit in Mill's scaling up from one to a thousand, that British exports are produced at constant cost, became a standard feature of the "Ricardian model" of the modern literature.

Torrens and Mill developed one of Smith's ideas, suppressing the rest. They advanced on his analysis by constructing arithmetical examples and evaluating the gain or loss involved in opening or closing trade.

V. "OBVIOUS . . . NATURAL . . . ENTIRELY ERRONEOUS"

In the next great debate over Britain's trade, attention shifted from all traded commodities to corn. Torrens's *Essay on the External Corn Trade* (1815) made

[3]The editorial material in Winch's (1966) selection of Mill's writings is very useful; see pp. 28–35 for an overview of the pamphlet. Thweatt (1976, pp. 211–12) discusses the advantage passage.

what Viner (1937, p. 441) called the "sole addition of consequence which the doctrine of comparative costs made to the eighteenth-century rule." The Torrens addition was the observation:

> If England should have acquired such a degree of skill in manufacturing, that with any given portion of her capital, she could prepare a quantity of cloth, for which the Polish cultivator would give a greater quantity of corn, than she [England] could, with the same portion of capital, raise from her own soil, then, tracts of her territory, though they should be equal, nay, even though they should be superior, to the lands in Poland, will be neglected: and a part of her supply of corn will be imported from that country (p. 263).

Robbins (1958, p. 23) comments, "This is quite clearly the leading practical application of the theory of Comparative Costs as conceived in the Classical tradition: and [. . .] is certainly a sufficient ground for the claim that Torrens was first in the field."

The *Essay* expounds the general principles of the external trade in corn, examines exceptions, and then treats the application of the principles to "these islands." The eighteenth-century rule figures in the first general part but the "addition" only in the third applications part. There Torrens argues that, "when trade is left free, and governments interfere neither directly nor indirectly with the course of industry, an agricultural country [. . .] may be induced to import a part of her supply of corn, by two distinct circumstances:—namely, by a deficiency in lands of first-rate quality; or, by advantages in manufacturing industry" (1815, p. 265).

Torrens treated the first circumstance as obvious but he emphasized the counter-intuitiveness of the second by leading up to it in this way:

> let us suppose, that there are in England, unreclaimed districts, from which corn might be raised at as small an expenditure of labour and capital as from the fertile plains of Poland. [. . .] [It] seems natural to conclude, that if industry were left to take its most profitable direction, capital would be employed in raising corn at home, rather than in bringing it from Poland at an equal prime cost, and a much greater expense of carriage. But this conclusion, however obvious and natural it may, at first sight, appear, might, on a closer examination, be found entirely erroneous (p. 263).

David Ricardo (1772–1824) published a piece on the same day as Torrens's *Essay*. This was the *Essay on the Influence of a Low Price of Corn on the Profits of Stock*; *shewing the Inexpediency of Restrictions on Importation* (1815). The eighteenth-century rule did not figure in it for the "inexpediency" of the restrictions was in their effect on the rate of profit. Although this argument remained Ricardo's main argument in favor of the free importation of corn, it played no role in the comparative advantage story before Jevons. This line of argument is considered in Gomes's chapter 5.

Ricardo (see Sraffa 1952, p. 188) read Torrens's *Essay*, telling Malthus that it was "on the whole a very able performance". After the publication of Ricardo's *Principles* Torrens raised some questions of priority (see Sraffa 1952a, pp. 179–80) and in the later editions Ricardo cited him but *not* for comparative advantage or for the Torrens addition. Robbins (1958, p. 32) argues that Ricardo's integrity

was such that he would have admitted Torrens's influence had there been any. However, it seems doubtful that Torrens would have raised the matter of comparative advantage for he did not mention it in his own second edition in 1820 or when he wrote a general account of trade in 1821. On this, see sections 9 and 11 below.

VI. ON THE PRINCIPLES OF POLITICAL ECONOMY

Ricardo's *On the Principles of Political Economy and Taxation* (1817) was neither a policy tract, like *The Economists Refuted* or *Commerce Defended*, nor a comprehensive treatise like John Stuart Mill's *Principles*. It treated topics that had "particularly engaged" Ricardo's attention, or so he told James Mill who had pressed him to decide whether to "include in [the book] a view of the whole science; so as you would lay it down to a person [. . .] who knew nothing about it" or to "content yourself with those parts of the science which you yourself have improved" (Sraffa 1952a, pp. 107, 112). Ricardo was happy to expound *some new* principles of political economy, leaving the first project to Mill.

The *Principles* falls into roughly equal parts on theory, taxation, and the errors of other writers. The theory determines the laws by which the produce of the earth is divided among the classes of the community—the "principal problem in Political Economy" (Ricardo 1817, p. 5)—but there were subsidiary enquiries into value, foreign trade, etc. The "received opinions" Ricardo (p. 6) "combated" were usually Smith's. Yet there was much in that "enlightened and beneficial system" which needed neither correction nor further justification. Thus Ricardo (p. 338) opens his critique of Smith's views on the effects of restricting the trade of colonies by declaring, "[Smith] has shewn, that by permitting every country freely to exchange the product of its industry when, and where it pleases, the best distribution of the labour of the world will be effected, and the greatest abundance of the necessaries and enjoyments of human life will be secured."

This may be the smile of the assassin but it is more like a straightforward description of what Ricardo took as already known. He would mention commonplace truths in case people thought he was denying them. Thus a significant new proposition about foreign trade (p. 133) contains the subordinate clause "though highly beneficial to a country as it increases the amount and variety of the objects on which revenue may be expended" but this was understood to be subordinate.

The *Principles* contains plenty of trade matter—numerous passages in the theory and taxation parts and entire chapters in the polemical part; Maneschi (1998, pp. 57–73) summarizes these parts. Trade in the theory part is usually associated with money as an imported commodity. In the taxation and polemical parts the eighteenth-century rule is worked hard—see e.g. pp. 170, 264, 295, 319—but the Torrens addition and the comparative advantage material appear only in the chapter "On Foreign Trade."

VII. ON FOREIGN TRADE

Viner, Robbins, and Chipman judged Ricardo more effective than Torrens in relating the principle of comparative advantage to a larger theoretical system.

Thweatt (1976, p. 221), however, thought the principle "did not fit in easily with the Ricardian theoretic structure of trade and development"; Gomes (pp. 142–43) summarizes other writing in a similar vein. Thweatt (pp. 221–28) inferred from the "very brief and almost casual treatment" and its "irrelevance" to the main themes of the book that Ricardo either did not write the comparative advantage material or wrote it at the behest of James Mill. In any case the reader "was not to take these three paragraphs too seriously."

"On Foreign Trade" is the last theory chapter. It begins (1817, pp. 128–33) with a topic that fits—how trade affects the rate of profit and closes with one that does not—the depreciation of the currency. In between are accounts of trade under barter and under a monetary regime. These accounts are linked by an example running through them. The advantage material is at least as organic as most of the chapter; and there is no need to suppose it was intruded by James Mill or anybody else.

It is hard to identify the key points of the chapter, the second longest in the theory part, for it is not divided into sections with headlines. However, a prospectus of a kind appears in the chapter "On Value" when Ricardo (p. 63) first considers money as a "variable commodity." If gold were mined at home, it would be subject to the causes of variation discussed in that chapter—but it is not:

> Money, from its being a commodity obtained from a foreign country, from its being the general medium of exchange between all civilized countries, and from its being also distributed among those countries in proportions which are ever changing with every improvement in commerce and machinery, and with every increasing difficulty of obtaining food and necessaries for an increasing population, is subject to incessant variations (p. 64).

The changing value of money affects the book's main theme in several ways, e.g., it is necessary to distinguish a rise in the price of corn due to the increasing difficulty of producing corn for a growing population from one due to a change acting on gold: the first reduces the profit rate while the second does not affect it (pp. 145–46, 336–37).

The passage containing the comparative advantage material consists of the paragraphs from pp. 135–36 reproduced as (3) to (5) in section 8 below. They belong to a "section" (pp. 133–37) consisting of ten paragraphs and a footnote. The section opens with three staccato paragraphs, three points that became essential parts of classical trade theory as expounded by J. S. Mill (1848). The first candidate headline opens the section (Ricardo 1817, p. 133): "The same rule which regulates the relative value of commodities in one country, does not regulate the relative value of the commodities exchanged between two or more countries".

Something new is being asserted, something important, for most of chapter 1 was taken up with establishing the domestic "rule." I will argue that this is *the* headline for the comparative advantage section. Commentators, however, usually focus on another candidate, embodied in the second paragraph: "Under a system of perfectly free commerce, each country naturally devotes its capital and labour to such employments as are most beneficial to each. [...] It is this principle which determines that wine shall be made in [...] Portugal [...] and hardware

[...] in England." Nothing here calls for a demonstration; there is nothing that would have surprised Smith. Any numerical example would have to conform to such an established principle but that is not to say that the point of the example is to persuade the reader that the principle is true or to illustrate its working.

The third possible headline, like the first, is original. It registers the difference the international dimension makes to earlier topics. "In one and the same country, profits are, generally speaking, always on the same level [...] It is not so between different countries." Mobility of capital is the key factor: domestic mobility underlies the value and profit theories of earlier chapters; international immobility underlies the eighteenth-century rule. This too was new: Smith had distinguished foreign trade by its slower turnover of capital and by the difference in treatment imposed by the "policy of Europe."

Going back to the "prospectus" and ticking off the items, money is "a commodity obtained from a foreign country" and so is not subject to the domestic rule. The "medium of exchange" theme is introduced in the passage bridging the barter and money sections:

> Gold and silver having been chosen for the general medium of circulation, they are, by the competition of commerce, distributed in such proportions amongst the different countries of the world, as to accommodate themselves to the natural traffic which would take place if no such metals existed, and the trade between countries were purely a trade of barter (p. 137).

The money section is not a technical footnote to the barter section, rather, as S. Hollander (1979, p. 465) says, the barter analysis is a "prologue" to the "central" monetary analysis.

In the *Elements* James Mill made much more of the barter material than Ricardo and it is possible that his enthusiasm—see section 10 below—may have already influenced the final form of the *Principles*, perhaps including the footnote discussed in section 9. However there is nothing to suggest any more massive intervention.

VIII. ENGLAND AND PORTUGAL

With sharp editing, the passage with the famous example (Ricardo 1817, pp. 134–36) can be made to yield almost any desired reading, so I have reproduced it almost intact. The "famous three-paragraph demonstration" (Gomes 1987, p. 142) consists of the paragraphs numbered (3) to (5) below. The two preceding paragraphs and the one following are also reproduced. The usual reading is that (3) to (5) show how the state of affairs described in (1) is realized, while (2) adds noise or perhaps gives a corollary. I suggest that (1) is an uncontroversial piece of scene-setting, applying principles generally recognized, while (2) has the charge. Points (3) and (4) introduce assumptions and apply the eighteenth-century rule to each country for (5) to pull everything together in support of the claim in (2). Point (6) elaborates on the differences between foreign and domestic trade that makes (2) possible. On this reading, the example is over-engineered for the value claim. However Portugal's absolute advantage, to which Ricardo draws attention with his "notwithstanding" in (4), dramatizes the contrast

between the two types of trade for under domestic conditions of capital mobility English cloth capacity would be removed to Portugal. The passage, with only minor cuts in (5) and (6), is this:

(1) If Portugal had no commercial connexion with other countries, instead of employing a great part of her capital and industry in the production of wines, with which she purchases for her own use the cloth and hardware of other countries, she would be obliged to devote a part of that capital to the manufacture of those commodities, which she would thus obtain probably inferior in quality as well as quantity.

(2) The quantity of wine which she shall give in exchange for the cloth of England is not determined by the respective quantities of labour devoted to the production of each, as it would be, if both commodities were manufactured in England, or both in Portugal.

(3) England may be so circumstanced, that to produce the cloth may require the labour of 100 men for one year; and if she attempted to make the wine, it might require the labour of 120 men for the same time. England would therefore find it her interest to import wine, and to purchase it by the exportation of cloth.

(4) To produce the wine in Portugal, might require only the labour of 80 men for one year, and to produce the cloth in the same country, might require the labour of 90 men for the same time. It would therefore be advantageous for her to export wine in exchange for cloth. This exchange might even take place, notwithstanding that the commodity imported by Portugal could be produced there with less labour than in England. Though she could make the cloth with the labour of 90 men, she would import it from a country where it required the labour of 100 men to produce it, because it would be advantageous to her rather to employ her capital in the production of wine, for which she would obtain more cloth from England, than she could produce by diverting a portion of her capital from the cultivation of vines to the manufacture of cloth.

(5) Thus England would give the produce of the labour of 100 men, for the produce of the labour of 80. Such an exchange could not take place between the individuals of the same country. The labour of 100 Englishmen cannot be given for that of 80 Englishmen [. . .] The difference [. . .] between a single country and many, is easily accounted for, by considering the difficulty with which capital moves from one country to another [. . .] and the activity with it invariably passes from one province to another in the same country.

(6) It would undoubtedly be advantageous to the capitalists of England, and to the consumers in both countries that under such circumstances, the wine and the 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. In that case, the relative value of these commodities would be regulated by the same principle, as if one were the produce of Yorkshire, and the other of London [...] [T]here could be no difference in the rate of profit, and no other difference in the real or labour price of commodities, than the additional quantity of labour required to convey them to the various markets where they were to be sold.

Like Torrens in 1808 (section 3, above), Ricardo takes ongoing trade but he shows for each partner why the alternative home-production possibility is inferior. The numbers could have been found by trial and error, but work in the footnote, discussed in the next section, indicates that Ricardo had more insight than this. In Ricardo's example trade would not take place if English and Portuguese labor had to exchange at parity; if, say, England's cloth consignment were reduced by one-fifth so that its labor content equaled that of Portugal's wine consignment, Portugal would withdraw from the trade. Ricardo does not draw this conclusion, but perhaps he thought the reader would.

The claim in (2) is a negative. Was there a positive rule for international values? Viner (1937, p. 446) thought not: Ricardo "does not indicate whether he regards this precise ratio [of cloth for wine] as required by the conditions of the problem [...] or how the actual ratio would in practice be determined." Yet elsewhere Ricardo wrote as if he had a rule, albeit one expressed in money terms. In the polemical chapter "On the Comparative Value of Gold, Corn and Labour in Rich and Poor Countries" (1817, p. 375; also 301–302, 325–26), he states: "the natural price [the money cost of production] of commodities in the exporting country [. . .] ultimately regulates the prices at which they shall be sold [. . .] in the importing country." This principle is consistent with his (pp. 137–42) discussion of the price changes following an improvement in English wine-making that has made the existing trade unprofitable; the price changes reflect the productivity change and the working of the specie-flow mechanism.

Behind the rule is the argument (p. 137) that if England imports wine the gold price of wine there must be equal to the gold price in Portugal plus a margin for carrying the wine, while the gold price in Portugal depends on the cost of producing wine and the value of gold. The value of gold is different in the two countries and so equal gold prices do not entail equal labor contents. Ricardo seems to have thought he had pinned down the value of money in his (pp. 143–5) and so the price rule determines a commodity exchange rule.

John Mill's essay (1844) with its account of price-determination under barter made the claim in (2) negligible. Ricardo's whole discussion of "not the same relative value rule" was reconfigured as one about comparative advantage and the overall rightness of the chapter was maximized by taking the material before the monetary bridge as an incomplete statement of the barter theory and the material after as a basically sound statement of the monetary theory. A weak argument about values became a strong argument about the pattern of trade. When Robbins introduced the reprint of Mill (1844) he sketched the "background":

> The theory of comparative cost [. . .] had indicated the nature of the advantages of territorial division of labour and the limiting cost ratios [. . .] between which exchanges advantageous to both parties could take place. But it did not decide at what rate these exchanges would take place and therefore the way in which the gains of trade would be divided (1967, p. ix).

Robbins's background is an assessment of what the theory of comparative cost—properly refined—could and could not do, not what it had done. This was not a pre-existing conceptual landscape into which Mill's essay fitted but one that the essay created.

IX. THE FOOTNOTE

The cloth and wine passage identifies the foundations of later trade theory in factor immobility, it re-emphasizes the eighteenth-century rule and it deploys 22 numerical examples—with the Torrens addition. These are considerable achievements but there is no statement of the principle of comparative advantage or allusion to it. However, there is more. Ricardo (1817, p. 136) attached a footnote to the end of (5). It begins "It will appear then" and goes into a discussion of the counterintuitive corn/manufacturing case (above section 5) but with a clearer description of the comparative production possibilities at home and abroad for both industries. Whether the case Ricardo addressed was one he associated with Torrens, one that was "in the air" or one he made up, it is hard to disagree with Chipman (1965, p. 481): Ricardo was "influenced" by Torrens "whether he was conscious of the indebtedness or not."

Viner and others have emphasised the England-Portugal passage but the footnote and particularly its last sentence constitute Ricardo's best claim to have formulated the principle:

> Two men can both make shoes and hats, and one is superior to the other in both employments; but in making hats, he can only exceed his competitor by one-fifth [...], and in making shoes by one-third [...];—will it not be for the interest of both, that the superior man should employ himself exclusively in making shoes, and the inferior man in making hats? (p. 136).

There are no productivity ratios in the cloth and wine example but here they are compared. In this example we have the Ricardian model of modern trade theory and complete specialization, although presumably a country imports only a "portion" of her corn. Ricardo refers the reader to Smith's tailor and shoemaker (section 2). He does not say why, whether he is explaining the phenomenon or correcting Smith's treatment or alluding to Smith's movement from the domestic to the international sphere—he merely refers.

Ricardo's footnote is a footnote; it can be excised without loss to the argument of the text—that international values follow different rules from domestic values. Someone with other priorities could turn the chapter upside down and extract a workable account of comparative advantage. However, as Thweatt (1976, p. 229) noted, none of the reviewers of the *Principles*—including Torrens—noticed this material. James Mill thought it important. He had already praised a draft of the trade chapter: among the "new propositions of the highest importance [...] which you fully prove" is "that it may be good for a country to import commodities from a country where the production of those same commodities costs more than it would cost at home" (see Sraffa 1952a, p. 99). Mill picked on a feature of the example—the Torrens addition—rather than the proposition it was meant to bolster. In the *Elements* Mill wanted to explain specialization and Ricardo's footnote became the text.

Mill's 1818 essay "Colony" has a section on the case "where profits of trade are the advantage sought by the mother country." Here, as in the *Principles*, Smith's views are criticized. That done, Mill drifts into a numerical example with England and Poland trading cloth for corn; the set-up is essentially Ricardo's, though the names recall Torrens. The example is used to support the proposition

that "a variation even in the cost of production gives no obstruction" to foreign trade. This discussion was not needed for the argument against Smith, but Mill was clearly bursting to give it. The treatment goes further than Ricardo's for Mill (p. 26) calculates each country's gain: England profits "to the extent of 10 men's labour," Poland to the extent of five. These figures measure the input saving—Mill's concern from 1808. Ricardo's paragraph (3) points to this way of calculating the gain while his (4) points to the output method used by Torrens in 1808.

X. "I PROFESS TO HAVE MADE NO DISCOVERY"

James Mill's *Elements* was a "school-book of Political Economy"—his son's (see Winch 1966, p. 204). John Stuart Mill (1806–73) recalled in his *Autobiography* (1873, p. 18) how as a thirteen year-old he was taken through a "complete course of political economy" and how his written account "served [his father] as notes from which to write" the book. It has been held—rightly I think—that the book expressed James's ideas, rather than his son's, until the third edition (1826) when he made alterations "grounded on criticisms" from John Stuart Mill's group of friends (see the *Autobiography*, p. 73).

Foreign trade is presented as a form of "Interchange," an arrangement both new and logical. Mill begins by describing the "Occasions on which it is the Interest of Nations to Exchange Commodities with one another." After outlining "obvious" cases involving "peculiar" advantages," Mill (1821, pp. 84–87: pp. 271–72)[4] presents numerical examples showing the significance of "relative facility." The summary proposition (p. 87: p. 273) is beginning to approximate Viner's statement of the doctrine (see section 1): "When both countries can produce both commodities, it is not greater absolute, but greater relative, facility, that induces one of them to confine itself to the production of one of the commodities, and to import the other."

Mill works through two 22 situations, following Ricardo's example but he does not work with exchange equivalents. His use of productivities resembles more the hatter and shoemaker example though Ricardo presented only the ratios. For Mill's first example the labor requirements for corn and cloth—taking as the unit of output what is produced by 100 units of Polish labor—are:

	Poland	England
1 unit of corn requires	100 days	150 days
1 unit of cloth requires	100 days	150 days

In this case "no exchange would take place" for there can be no gain from trade. Mill appealed to the motives and mechanism he had described in 1808 (see section 4 above):

[4]The first reference in (pp. 84–87: pp. 271–72) is to the page in the original publication, the first edition here, and the second to the corresponding page in Winch (1966). The originals are easily accessible from Aldrich (2002).

> the cloth of 150 days' labour in England, if sent to Poland, would be equal to the cloth of 100 days' labour in Poland: if exchanged for corn, therefore, it would exchange for the corn of only 100 days' labour. But the corn of 100 days' labour in Poland was supposed to be the same quantity with that of 150 days' labour in England. With 150 days' labour in cloth, therefore, England would only get as much corn in Poland as she could raise with 150 days' labour at home; and she would, on importing it, have the cost of carriage besides (p. 85: p. 272)

Mill does not calculate productivity ratios; but, writing of Poland, he says that the "degree in which [she] can produce with less labour is the same in both cases."

Mill next considers the countries' gain from trade under changed conditions:

	Poland	England
1 unit of corn requires	100 days	200 days
1 unit of cloth requires	100 days	150 days

As in the no-trade situation Mill (p. 86: p. 272) treats England as though she can deal at Polish prices: "With a quantity of cloth which England produced with 150 days' labour, she would be able to purchase as much corn in Poland as was there produced with 100 days' labour; but the quantity, which was there produced with 100 days labour, would be as great as the quantity produced in England with 200 days' labour." It is implied that there is a saving of 50 days though Mill says only that "England [. . .] would obtain her corn with her labour, through the medium of her cloth."

Mill says that the power of Poland is "reciprocal" and prepares the reader for a parallel treatment, but this goes awry. The parallel argument is that a unit of Polish corn costing 100 days' labor buys 200/150 units of cloth in England, which would have cost 133 days' labor in Poland, representing a gain of 33. Mill does not get this answer; he makes the wrong comparison and concludes: "If, with the produce of one hundred days' labour, she can purchase, not the produce of one hundred and fifty, but the produce of two hundred, she gains to the amount of fifty days' labour; in other words, a third."

Perhaps he thought the answer must be fifty, the same as England's gain, though in the article on colonies the countries' gains were not equal. This mistake was not corrected in the third edition though the bigger mistake of having each country trading at the other's price was. Perhaps it contributed to Mill's sense that the advantage would be divided equally between the countries.

Thweatt (1986, p. 36) poses the "interesting" question of why James made a mistake here—the big one—when he had not in the *Colony* and suggests that the error crept in when J. S. Mill wrote up the lecture. James, however, was the sort of teacher who made his son "write over and over again until [his account] was clear, precise and tolerably complete." More interesting perhaps is how Thweatt's question illustrates the distortionary power of hindsight, the principal weakness of accounts of the history of comparative advantage. In 1821 the two

Mills and Ricardo read the *Elements* —J. S. Mill wrote marginal summaries—and no one spotted the mistake. This suggests that it was difficult to relate the idiom of the *Principles* and the *Colony* to that of *Commerce Defended* and the *Elements.*

The second edition of the *Elements* (1824) introduces a second example—England and Germany exchanging cloth and linen, again each country trading at the other's prices (p. 118: p. 273). Thweatt (p. 39) spots J. S. Mill's signature here, for he used these goods and countries in his own writings. However there is no record that J. S. Mill played any part in this production and the England/Germany scenario was already in the first edition of the book—in the final section (p. 231: p. 363) on duties on imported commodities. It is plausible that J. S. Mill influenced James—if there is another economist in the house, why ignore him? But would James let his son write and re-write his book?

In the third edition (1826) James "corrected an error of the former editions" (p. iv: p. 206). He (p. 121: p. 272) altered the ending of the England paragraph to: "If the exchange [...] was made in this manner, the whole of the advantage would be on the part of England; and Poland would gain nothing, paying as much for the cloth she received from England, as the cost of producing it for herself." After making the same point about Poland he (p. 122: p. 273) wrote, "The result of competition would be to divide the advantage equally between them." The discussion continues into an enlarged paragraph on England and Germany where he argues "It is the inevitable effect of such an interchange to bring the relative value of the two commodities to a level in the two countries." However, he does not attempt to show why the advantage is divided equally. According to J. S. Mill's *Autobiography* (1873, p. 73) the impetus for revision came from his group of friends that had been working through the *Elements.* However, John added that while his father modified his opinions, he did not modify them to "the extent of our new speculations." Those new speculations involving demand were contained in the essay John finally published in 1844 (see section 12 below).

Comparative advantage was now a presence. In the preface to the first edition Mill (1821, p. iv: p. 204) stated he would cite no authorities for the "learner should fix his mind upon the doctrine and its evidence, without any extraneous consideration," adding "I cannot fear any imputation of plagiarism, because I profess to have made no discovery." Mill wanted it understood that the ideas were Ricardo's. Ricardo received an early copy. He had not expected to be surprised by the text and in the main wasn't: he wrote notes on things "in which we do not quite agree" (p. 117), saying nothing about comparative advantage (see Sraffa 1952b, pp. 126–33).

The first published criticism of Mill's analysis came from James Pennington (1840). As Sraffa (1930) explained, Pennington criticized the original analysis, not the corrected third edition. Pennington (p. 36) exposed the contradiction and suggested that the terms of exchange would probably fluctuate between the cost ratios in the two countries "according to the temporary variations of demand and supply." These ideas had already been worked out more thoroughly by John Mill, though they were not yet published.

XI. A PRINCIPLE "MR. RICARDO ADOPTED"

Of the contributors to comparative advantage, only Torrens claimed he had discovered anything. In the third edition of the *Essay* he (1826, p. vii) reported how in the first he had shown "for the first time," he believes, "that commodities, the cost of producing which is greater in foreign countries than at home, may nevertheless be imported, provided the comparative disadvantage of the foreign capitalist in producing the imported article, be less than the comparative advantage of the domestic capitalist in producing the articles exported in exchange."

Furthermore Mr. Ricardo had "adopted" this principle. It is plausible that Ricardo adopted *something*, though what Torrens wrote in 1815 was some way from this principle: it lacked the stress on comparison, for Robbins (1958, p. 23) the "ultimate essence" of the principle. It also sat with the applications not with the principles. It seems most likely that in 1815 Torrens saw the case as a striking and practically important exception to the general rule rather than the clearest exemplification of a new general rule. Torrens did not make the priority claim in 1820, in the first post-*Principles* edition, but in the first post-*Elements* edition. Before the *Elements* there was no principle to claim. After the *Elements* there could be no innocent readers of the *Principles.*

Comparative advantage did not figure in the long discussion of foreign trade in Torrens's treatise, *Essay on the Production of Wealth*, of 1821, as Hollander noted when he rejected Torrens as discoverer (1911, p. 463). This treatise provided a natural experiment, a test of Torrens's grasp of comparative advantage. As in Sherlock Holmes's "curious incident of the dog in the night-time," Torrens did *not* bark. The basic principles of the *Production of Wealth* are "peculiar" (absolute) advantage and the eighteenth-century rule (1821, pp. 248–52). There are nice 22 arithmetical examples, presumably inspired by Ricardo's. Torrens (pp. 273–74) treats a case where England and France both produce cotton and silk but England has an absolute advantage in cotton and France in silk. He considers the quantities of the goods produced in each country and shows how total output can be increased by specialization; this consideration also appears in J. S. Mill (1844). Torrens (1821, p. 274) states that "according to the law of competition," the extra output is divided equally between the two.

The fourth edition of the *External Corn Trade* (1827) was a significant post-*Elements* work. It contains new material on the "effects of free trade on the value of money" (pp. 394–428), refining the treatment in Ricardo's chapter. As a preliminary Torrens (p. 401) investigates "the circumstances which determine the exchangeable value of foreign commodities." The phrase "comparative cost" (cf. Viner p. 443n) appears and Torrens works with ratios of productivities. He begins by supposing productivity levels in England double those in Poland and shows that there can be no interchange between them, then:

> if, in Poland, the cost of producing cloth and iron, &c. &c. continued to be twice as great as in England, while the cost of raising corn fell to an equality with the cost of raising it in England, then Polish corn would be exchanged for English cloth and iron. Under these circumstances, a quarter of corn, in Poland, would be worth only half a bale of cloth, or half a ton of iron; while in England, it would be worth a whole bale, or a whole ton (1827, pp. 402–403).

So far the formulation resembles James Mill's but with more stress on the ratios, however Torrens goes on to recognize the role of demand and his treatment is closer to John Mill's later essay than to anything by James.

Looking over Torrens's work in the 1820s, the *Production of Wealth* has new points but is mainly interesting as demonstrating how elusive the principle of comparative advantage was, even for the best prepared. The fourth edition of the *External Corn Trade* has a claim to be the final chapter in the discovery story but this is overwhelmed by the claim for John Mill's essay discussed in the next section. There is no evidence that Torrens's writings did very much to achieve "general acceptance" for the principle of comparative advantage but they stimulated the publication of writings that did. Torrens's *Budget* (1844) pushed John Mill into publishing his old essay.

XII. PATIENCE AND CIRCUMSPECTION

"Of the Laws of Interchange between Nations; and the Distribution of the Gains of Commerce among the Countries of the Commercial World," the essay John Mill wrote in 1829–30, is both the end of the story and the beginning of the history. It has "perhaps the first completely satisfactory" statement of the principle (Chipman 1965, p. 482n) and the first history of the discovery. This most influential history had no place for Torrens or James Mill.

John Stuart Mill (1844, pp. 232–33) told how Smith's "conceptions" (see section 2) gave way to Ricardo's "philosophical exposition which explains, with strict precision, the nature of that advantage, and affords an accurate measure of its amount." For Mill the *Principles* was difference between *The Wealth of Nations* and modern truth. He appears to deduce its contents from this subtraction, finding things that were not there and missing things that were. He quotes from the *Elements* not the *Principles.*

To illustrate what Ricardo "shewed" John reproduced the England/Poland example, omitting the concluding sentences on the gain (see section 10). That done, Mill concludes:

> It is established, that the advantage which two countries derive from trading with each other, results from the more advantageous employment which thence arises, of [. . .] the labour [. . .] of both jointly. The circumstances are such, that if each country confines itself to the production of one commodity, there is a greater total return to the labour of both together; and this increase of produce forms the whole of what the two countries taken together gain by the trade (1844, p. 235).

Mill is ready to begin his own business, "to inquire, in what proportion the increase of produce, arising from the saving of labour, is divided between the two countries." First he remarks of Ricardo's effort:

> while intending to go no further into the question of the advantage of foreign trade than to show what it consisted of, and under what circumstances it arose, [Ricardo] unguardedly expressed himself as if each of the two countries making the exchange separately gained the whole of difference between the comparative costs of the two commodities in one country and in the other (1844, p. 235).

Mill (p. 236) excused this as "a mere oversight"—but of course this was not in Ricardo. Sraffa (1930, pp. 541–42) suggested that John misread Ricardo, thinking his numerical example was organized on Jamesian lines or he did not read Ricardo, taking James's exposition as authoritative. Either way, J. S. Mill's Ricardo *is* James Mill.

J. S. Mill's criticism of Ricardo is literally wrong but in a larger sense it is well-directed for the concern with the law of value in international trade translates into a concern about the division of the gain. Mill argues that the principle, value is proportional to the cost of production, is inapplicable as labor and capital will not move. This had been a leading point for Ricardo but Mill does not cite him, perhaps because the argument did not go into the *Elements*. Mill (1844, p. 237) takes the new step of "reverting" to the "anterior" principle of demand and supply. His analysis of the role of demand became standard although he did not consider that the "inclinations and circumstances of consumers" could be "reduced to any rule." The rule he ventures is that: "the limits within which the variation is confined are the ratio between their costs of production in one country, and the ratio between their costs in the other" (p. 240).

Stigler (1955, pp. 295–96) argues that most economists who make an impact do so by adopting the methods of the huckster and that J. S. Mill had less impact than he deserved because he "avoided all the techniques of easy success." Though he was no huckster in his own—or his father's—cause he was one in Ricardo's.[5] He described how Ricardo had laid the foundations, although "having a science to create, [he] had not time, or room, to occupy himself with much more than the leading principle" (1844, p. 235). For those who had "thoroughly entered into the spirit of his discoveries" all that was required was "patience and circumspection in tracing principles to their results."

XIII. UNSURPASSED EXPOSITION

J. S. Mill's *Principles of Political Economy* (1848) contains the definitive account of classical international trade theory. The succession of chapters looks like an enlargement of Ricardo's chapter, thus ensuring Ricardo his place as "the founder of the theory" (Edgeworth 1894, p. 606). The chapters start with an account of comparative advantage, including a tribute to Ricardo as "the thinker who has done most towards clearing up the subject" (1848, p. 576), and close with an account of how the barter analysis can accommodate money. In his chapter on the distribution of the precious metals Mill (p. 625) quotes Ricardo's bridging proposition (section 7), adding: "Of this principle, so fertile in consequences, previous to which the theory of foreign trade was an unintelligible chaos, Mr. Ricardo, though he did not pursue it into its ramifications, was the real originator." As usual the *Wealth of Nations* epitomized the pre-Ricardian chaos.

Torrens wanted his share in the clearing up to be acknowledged and he reprinted *The Economists Refuted* to show how much it contained of "the corrected theory of the nature and extent of the advantages derived from foreign

[5]Stigler (1976, p. 96) discusses J. S. Mill's treatment of his father's writing.

trade" (1857, p. xv). In the fifth edition of the *Principles* Mill (1862, p. 576n.) conceded that Torrens had "at least a joint claim with Mr. Ricardo to the origination of the doctrine, and an exclusive one to its earliest publication." The "doctrine" appears to be the eighteenth-century rule and Mill's concession perhaps indicates that he judged the eighteenth-century rule to be the fundamental break-through without realizing just how commonplace it was. In the twentieth-century Viner was equally enthusiastic but placed the rule more than a hundred years before Torrens.

Edgeworth, (1894, pp. 606–607) in the first review of trade theory from a neoclassical standpoint, deemed Mill's exposition "still unsurpassed." However he also praised the "incomparable vigour" of Ricardo's chapter where the "main propositions of the theory"—including comparative advantage—were stated "more briefly, and perhaps more clearly, than by J. S. Mill." The highlights of the grand tour of classical barter theory were now established: go to Ricardo (1817) for comparative advantage, Mill (1844) for the theory of international values, and Mill (1848) for the unsurpassed exposition. Mill (1821) was superfluous, worth a visit perhaps for its gratuitous blunder. Its most outstanding feature was a blunder.

XIV. CONCLUSION

Maneschi (1998, p. 57) argued that Thweatt's case for James Mill "would be more compelling" if there were a smoking gun—a "manuscript of Mill containing the essence of the doctrine and dated before 1817." The main point of this paper can be stated by extending the analogy: there was scarcely a smoking gun in 1817, only an elaborately wrought instrument which we have been taught was a gun and, as such, a smoke-maker.

I have followed the classic accounts of Viner and Robbins and presented the doctrine of comparative advantage as developing from the eighteenth-century rule and the Torrens addition. Torrens did not provide the further development needed to produce the doctrine and, while Ricardo did, it was not his chief goal. This was the proposition that the law of value for international transactions is not the same as that for domestic transactions. However, a footnote indicated a different development and James Mill responded to this in the *Elements*. The defects in Mill's treatment made openings for J. S. Mill, Torrens, and Pennington. J. S. Mill's (1844, 1948) constructions rested on foundations given in the *Principles*, but he seems to have found them by reflecting on a book much closer to home.

In this story there is not much room for multiple discovery—at least in the Merton sense of *independent* discoveries. The dates 1815, 1817, 1821, …, 1848 show text growing out of text. On two occasions, perhaps, an idea was reached independently—in 1808 when James Mill and Torrens applied the eighteenth-century rule to gauge the effect of the blockade and in 1827–30 when Torrens and J. S. Mill tried to straighten out the argument of the *Elements.* Outside the published texts there is some information on the interactions between the principals as well as room for a great deal of speculation.

Apart from the *Considerations upon the East-India Trade*, there has been no

major addition to the corpus of writings on the discovery of comparative advantage for a century. Thweatt's new story came from re-matching writers and writings but he did not read the established writings in a new way, except to find some frivolity in Ricardo. My story involves reinterpreting Ricardo's chapter, showing that he did not give due emphasis to the doctrine, did not place it in an appropriate setting, and did not obtain general acceptance for it by economists. Other commentators have been perplexed by, or have apologized for, Ricardo's contribution: Chipman (1965, p. 480) found his statement of the principle "quite wanting, so much so as to cast some doubt as to whether he truly understood it"; O'Brien (1975, p. 173) contrasted what Ricardo did "explicitly" with what is "implied." James Mill's statement was not wanting, and he drew the right implications. When Hollander (1911, p. 463) described the *Elements* as setting forth the theory "with model clearness" he was actually describing its first outing.

This re-examination of the longest-running discovery story in the history of economic theory may have lessons for other episodes. One lesson is that implications are not necessarily obvious *ex ante*; in the present case extracting them was no routine exercise and the best people made serious errors and overlooked the obvious. Another lesson is that contributors are judged as much by the roles they chose for themselves, as by what they did. James Mill, the textbook writer, disqualified himself from being taken seriously; a textbook with a major flaw is too trashy to be a major document in the history of economic thought.

Both James and J. S. Mill presented themselves as followers, indeed they *felt* they were followers.[6] But feeling does not make it so. J. S. Mill's achievement was so great and so clear that he was not taken at his own valuation while James's achievement quickly became invisible and his own valuation has stood. A famous passage in Pigou's *In Memoriam*: *Alfred Marshall* gives some insight into the student's elevation of the master:

> I remember not once but many times, getting hold of some problem, and after labouring over it with toil and pain, imagining proudly that I had made an original contribution to economic thought. I then turned to Marshall's *Principles*, and almost invariably in some obscure footnote there was a half a clause, inside a parenthesis perhaps, which made it obvious that Marshall had solved this problem long ago but had not thought it worth while to write the answer down (p. 85).

James Mill did *not* leave the footnote where it was for he always knew that the original *Principles* omitted much that was worth writing down. He got no credit for raising the footnote and he did not seem to want any.

[6] Of course, few followers do so much to create their masters. Hutchison (1978) has a nice account of James Mill and Ricardian economics.

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