

Some Notes on Foreign Trade: Ricardo after Sraffa

Sergio Parrinello

Centro Sraffa Working Papers n. 72

May 2025

ISSN: 2284-2845 Centro Sraffa working papers [online]

\$%\$%\$

Some Notes on Foreign Trade: Ricardo after Sraffa

Sergio Parrinello

University of Rome "La Sapienza"

Abstract

Recent years have seen a reinterpretation of Ricardo's numerical example on foreign trade from Sraffa's note (1930), prompting economic historians and theorists to reconsider the scope of the example. This article seeks to clarify the revised interpretation and explain the common and distinct principles that govern the laws of comparative and absolute advantage. The condition of balanced trade in aggregated value is emphasized relative to the equations of normal prices based on this revisiting. Its special role is shown by the reformulation of Sraffa's price equations for two trading economies without international capital movements. It is proved that there is no additional degree of freedom for the choice of exogenous distributive variables if countries move from a state of autarky to one of free trade.

Keywords: David Ricardo; comparative advantage; absolute advantage; trade balance; global economy

JEL codes: F10; B12; B17

1. Introduction¹

A revised interpretation of Ricardo's numerical example and a reassessment of his principle of comparative costs derive from Sraffa's note (1930) and, as Tabuchi (2017) observed, have been initially formulated by the Japanese economist Yukizawa (1974).² I will call them the "Example" and the Ricardo's "Principle", respectively. Parrinello (1988) and Ruffin (2002) revived and expanded this reinterpretation, which consists of a presence and absence of hypotheses, compared to that adopted in most textbooks and by previous historians of comparative advantages. On the one hand, the Example assumes given traded quantities, although these do not have numbers assigned. Furthermore, it does not assume fixed input-output coefficients and allows accounting for decreasing returns to scale and incomplete specialization or increasing returns outside the firms. The resulting reappraisal of Ricardo's Principle reflects two different theoretical perspectives The first, adopted in Ruffin (2002), leads to the neoclassical developments of the theory of international trade. The absence of hypotheses on returns to scale has led Maneschi (2004) to reformulate the textbook Ricardian model of foreign trade, freeing it from the hypothesis of fixed production coefficients. This reformulation preserves the assumptions of the terms of trade determined by reciprocal demand functions and economies that produce at points on their production possibility frontiers before and after trade. Instead, Parrinello (1988, 2022) applies the same interpretation to a model of foreign trade that assumes that the supply of labour is not binding because either the frontier adjusts to the demand for labour, or the production point is placed below it. The former property can be attributed to an endogenous supply of labour according to the classical theory of population, instead the latter would describe a state of unemployment explained by Keynes's principle of effective demand.

The two primary themes of Ricardo's chapter "On Foreign Trade" (Ricardo 1817-1951, Ch. VII) are the gains from foreign trade and the inability of the labour theory of value to determine normal prices under international trade. Our notes are concerned with the first focus and resume the re-interpretation from the second perspective mentioned above to assess the scope of the Example and Ricardo's Principle. After an overview of the basic subject in Section II, we will observe in Section III that the Example describes the conditions for the existence of mutual gains from international trade, but it does not explain the direction of the exchange of the given traded quantities between the two countries. Section IV will argue that the absolute advantage attributed to one country (Portugal) in terms of minor labour requirements cannot guarantee, without further provisos, the higher benefits that would accrue from the full integration of the two economies and the consequent concentration of capital in the superior country.

¹ The author expresses his gratitude to Enrico Bellino and Saverio Fratini for a live stimulating discussion of this paper. An early draft has benefited from the comments by Adriano Birolo, Takao Fujimoto and Christian Gehrke. The usual disclaimer applies for any remaining errors, imperfections, and omissions.

² As reported by Gehrke, (2024, Appendix B), Grote's (1818-1823) reflections on the "Effect of Taxation on Foreign Trade" seem to have prefigured the new interpretation.

Considering the price equations associated with the example, section V explains that the choice of the independent distributive variables has no additional degree of freedom if we move from a state of autarky to that of open economies. Hence, the role of institutional factors affecting the distribution of the social surplus cannot increase through the commercial links. Section VI resumes the separation property of Ricardo's approach to two interconnected economies. Sections VII, VIII and IX apply the theoretical framework discussed in the previous sections, by reformulating Sraffa's price equations for a system of two interconnected economies. Section X acknowledges some simplifications made in early neo-Ricardian models of foreign trade and outlines a research agenda to overcome them.

2. The Example and its price equations

Let us start with Sraffa table that describes Ricardo's Example.

Number of men whose labour is required for one year to produce a given quantity of

Cloth Wine In Portugal $L_{y_i}^p = 90$ $L_x^p = 80$ In England $L_y^e = 100$ $L_x^e = 1200$

Sraffa states:

"It would therefore be advantageous for England to export cloth in exchange for wine imported from Portugal, and for Portugal to export wine in exchange for cloth from England. Under these circumstances, 'England gives the cloth produced by 100 Englishmen in exchange for the wine produced by 80 Portuguese, and since this quantity could only have been produced by 120 Englishmen, she gains the labour of 20 Englishmen. Portugal gives the wine produced by 80 Portuguese for the cloth produced by 100 Englishmen; the production of this cloth would have required the labour of 90 Portuguese, and therefore Portugal gains the labour of 10 Portuguese." (Sraffa 1930, p. 541).

The table with the four *magic* (in Samuelson's word) numbers and Sraffa's passage have been used to introduce the revised interpretation of the example. In particular, Ruffin states:

Let X be 'the quantity of wine' that is traded for Y units of cloth. If England requires 120 men for one year to make X units of wine and 100 men to make Y units of cloth, "England would therefore find it her interest to import wine and to purchase it by the exportation of cloth." (Ruffin 2002, pp. 741–742).

It is therefore assumed that the unnumbered quantities of wine X and cloth Y, associated with the given amounts of labour, are known, and actually traded. The Example explains

the conditions under which trade of *X* against *Y* in a certain direction minimizes the total labour requirement in each country, compared to no trade. The condition for the mutual saving of labour from the exchange of Portuguese wine for English cloth is the double weak inequality:

$$\frac{L_x^p/X}{L_y^p/Y} \le Y/X \le \frac{L_x^e/X}{L_y^e/Y} \qquad (1)$$

where $X = X^{p \to e}$ and $Y = Y^{e \to p}$ meaning directed quantities. The condition (1) must be satisfied independently of the institutional organization of the economy; it must hold both in centrally planned and market economies. In the latter the following condition applies in terms of the international relative price:

$$\frac{L_x^p/X}{L_y^p/Y} \le \frac{p_x}{p_y} \le \frac{L_x^e/X}{L_y^e/Y}$$
(2)

where p_x and p_y are the absolute prices of wine and cloth. "Absolute" here means "not relative" in a strict sense. For example, the absolute price of cloth, p_y is 100 per one yard and its dimension is the inverse of that of the commodity. The absolute price is not a price in terms of fiat money, gold, or guineas, but *a pure number per physical unit* and only the ratio between two absolute prices has an economic meaning. The link between (1) and (2) will be derived in section V from the equation of balanced trade combined with the normal price equations formulated as follows. Let w^p , w^e denote the absolute wage rates and r^P , r^e the rates of profit, where the suffix p, e refers to the two countries. The normal price equations under free competition³ and the supposed specialization are:

$$p_{x} = w^{p} \left(\frac{L_{x}^{p}}{X}\right)(1+r^{p})$$

$$p_{y} = w^{e} \left(\frac{L_{y}^{e}}{Y}\right)(1+r^{e})$$
(3)

where wages are assumed to be paid *ex ante factum*. Except for the case where the real wage rate of each country is fixed in terms of its own product, $(w^p/p_x, w^e/p_y)$, the equations (3), combined with a given choice of the numéraire, allow three degrees of freedom for the choice of the exogenous variables within their feasible range. In particular, if we fix both real wage rates, it is still possible to assume one rate of profit as given. Section V will show that this logical possibility can be misleading.

3. A limited scope of the Example

The gains from trade in the classical tradition are labour-saving by definition and potentially consumption-augmenting. The unnumbered quantities X and Y must comply with such a characterization of the gains. The exchange of X for Y in two opposite

³ I use the term "free competition" in the sense that the Classical English economists used, as distinct from the neoclassical notion of perfect competition.

directions cannot be observed simultaneously, and the quantities of labour requirements $L_x^p, L_y^p, L_x^e, L_y^e$ cannot be observed either, but they must be *attributed* to the amounts exchanged.⁴ If we know only the table of the four numbers, then also the direction of the exchange between England and Portugal should be known in advance, in order to determine the gains from trade. Furthermore, the statement that labour is required to produce (Sraffa 1930) or make (Ruffin 2002) suggests the need for a theory that explains why production is required. Let's suppose that the amounts of cloth and wine for domestic use, denoted by $Q_x^p, Q_y^p, Q_x^e, Q_y^e$, are given and observed as actual consumption or investment. Let us assume for the moment that the quantities exchanged X, Y and the total outputs of cloth and wine of each country are unknown. The same criterion of choice of techniques that holds in a closed economy determines X and Y and their respective directions.⁵ Such criterion, called the Principle of Competition from here onwards, imposes that the price of the output from each production process must not be greater than its unit production cost, including the normal profit, and, if it is lower, the process will not be active. This rule, applied to a closed economy under sufficiently general conditions, implies that, given one of the two distributive variables within its feasible range, the other will be maximized.

Ricardo departs from the previous distinction between known and unknown quantities by assuming that the quantities X and Y, along with their respective directions, are already known. The total output of each industry in each country can then be derived from the exchanged quantities and those required for domestic use, Q_x^p , Q_y^p , Q_x^e , Q_y^e . Therefore, the "number of men" L_x^p , L_y^p , L_x^e , L_y^e , is the result of sums and subtractions of quantities of labour required to produce the total outputs under free trade, compared to those in autarky and satisfying the same domestic demand. Notice that for the sake of Ricardo's argument, it is not necessary to prove the disadvantages that would derive from the exchange in the inverted "wrong" directions, where $X = X^{e \to p}$ and $Y = Y^{p \to e}$. For this proof, another table of labour requirements L_x^p , L_y^p , L_x^e , L_y^e should be available if we abandon the case of fixed input-output coefficients, and as a result, the conditions (1) and (2) should be requalified.

⁴ Ricardo dispenses the determination of the distributive variables from counterfactual reasoning, but he does not avoid it dealing with the choice of international specialization that is tantamount to a choice of techniques. This statement relates to the position held by Kurz, Salvadori and Signorino (2024) about the use of counterfactuals in Sraffa.

⁵ See Parrinello (2022).

4. Labour requirements across countries and the advantages of full integration

Ricardo's example of the shoemaker and hatter⁶ describes intuitively the Principle and his exegetes have noticed the counterintuitive feature of his Example of the two trading countries. What intuition is being questioned, however? It is incorrectly envisaged that it is not convenient for England to deliver a quantity of cloth X for a quantity of wine Ybecause the work contained in the first (100 units) is greater than the work contained in the second (80 units). This is the intuition of a capitalist producer from a lower country who places himself from a supranational perspective regarding both countries. From this standpoint, it would be in the interests of English capitalists to not specialize and to move their capital and possibly English workers from their inferior country to the more efficient one. This would let them make X units of wine abroad, which would save them even more labour than the exchange. The intuition suggests that both English industries would be relocated in Portugal because of the absolute advantage of this country, but this is in contrast with the assumption of international capital immobility. However, even if such mobility existed, and we were to evaluate the advantages of integrating the two economies besides trade in commodities alone, the intuition would not be well-founded without further assumptions. It depends, in fact, on the comparison of the quantities of work across different countries, and this account does not enter into the demonstration of Ricardo's Principle, as Grote (1818-1823)⁷ observed in passing and Cairnes (1874) elucidated.⁸ Let us consider the following differences derived from the example

> Cloth industry: $L_y^e - L_y^p = 100 - 90 = 10$ Wine industry: $L_x^e - L_x^p = 120 - 80 = 40$

Without additional assumptions, these differences in labour requirements cannot be interpreted as differences in the real costs that bring about capital movements.

If the countries were to be integrated through the mobility of capital, we could assume $r^p = r^e$ and obtain from (3):

⁶ Ricardo elucidates the intuitive aspect of his example in the following note. "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 neighbours, may, in return for such commodities, import a portion of the corn required for its consumption, even if its land were more fertile, and corn could be grown with less labour than in the country from which it was imported. Two men can both make both 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 or 20 per cent; and in making shoes he can exceed him by one-third or 33 per cent; - 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?" (*Principles* 1817-1951, Ch. VII, note 20).

⁷ See Gehrke (2024).

⁸ "When it is said that international trade depends on the difference in the comparative, not the absolute, cost of producing commodities, the costs compared, it must be carefully noted, are the costs in each country of the commodities which are the subject of exchange, not the different costs of the same commodity in the exchanging countries. [...] England might be able to raise coal at one-half of the amount of labour and abstinence needed in France, but this alone would not render it profitable for France to obtain her coal from England." (Cairnes 1874, p. 312).

$$\frac{p_x}{p_y} = \left(\frac{w^p}{w^e}\right) \frac{L_x^p Y}{L_y^e X}$$

We could also assume that the wage ratio is a sufficiently stable datum depending on persistent institutional factors that are country specific and use it to convert the quantities of heterogeneous labour into a single amount. This rule of reduction to homogeneous labour, which is already questionable, cannot hold when applied to labour across national economies such as Portugal and England. English and Portuguese workers are not perfect substitutes. The different national institutions and the limited international mobility of workers make it possible for the wage rates paid in the two countries to be different without being related by a fixed proportion. It follows from this that the mere difference in the productivity of labour across the two countries cannot mean that one of them is more efficient than the other in terms of absolute real costs. Certain contributions⁹ aimed at demonstrating the advantages of full economic integration have implicitly assumed that the numbered quantities of labour in the example are homogeneous across national economies. This is a legitimate simplification; however, it conflicts with Ricardo's beliefs regarding the skills of workers from diverse nations.

5. Only two degrees of freedom for the distributive variables.

As mentioned in Section II, the price equations (3), combined with the equation that specifies the choice of the numéraire, and given the values of two distributive variables chosen among w^p, r^p, w^e and r^e , in general leave one degree of freedom. This formal property may suggest an enlarged scope of the Ricardian model of international trade. The role of institutional factors, geopolitics, and class struggle seems to expand if the two countries move from autarky to free trade. Based on the equations (3), we may speculate about various rival or collusive actions by national trade unions, capitalistic associations, and monetary authorities, which can have an impact on the distributive variables by affecting money wage rates and interest rates. Instead, according to the basic features of Ricardo's theory of international trade, such an enlargement of role for national or super national institutions, which might be a subject pertaining to game theory, is missing. Because of the absence of international capital movements, the following equation of balanced trade fills the empty seat on side of the distributive variables:

$$p_x X^{p \to e} = p_y Y^{e \to p} \tag{4}$$

This equation links condition (2) to (1) in the Example, and shows that the equation

$$\frac{Y}{X} = \frac{p_x}{p_y}$$

⁹ See the theory of economic integration introduced by Ricardo's example in Montani (2011).

is not an identity that defines the international relative price as the ratio between traded quantities, but rather a condition that precludes the existence of net capital flows between the two countries. Therefore, (1) is the primary condition for the mutual gains from trade, whereas (2) can be interpreted as a condition derived from the former under the proviso of balanced trade. One might wonder what capital flows between countries which are indistinguishable from barter economies mean. We respond that financial flows can also occur among barter economies in terms of credits and debits denominated in physical commodities, such as a debit denominated in a quantity of cloth against the repayment of cloth or another commodity.

6. The Separation Property

In the absence of capital movements across countries, the specific feature of the choice of international specialization rests on the fact that the choice of productive activities in a national partition depends on the assumption of a parametric relative price of the tradeable commodities. In fact, this choice satisfies the *Separation Property* that characterizes Ricardo's Principle. Ruffin states (2002, p. 6):

"The law [of comparative advantage] has a separation property: we can deduce any one country's pattern of specialization just from the price ratio and the relative cost ratio, no matter how many countries. Ricardo took great advantage of this separation property and used it to prove his theorem".

According to the Separation Property, each country's specialization is independent of the production conditions in the other one. It depends entirely on the domestic conditions and the terms of trade. Let the two interconnected economies be called the *global economy* from here onwards. The coefficients of each price equation (3) can be interpreted as the result of the Principle of Competition applied to a national partition of the global economy, which selects the one from its available techniques that, given its own real wage rate and the terms of trade, minimizes the domestic costs of production and, in general, maximizes its own rate of profit. We can interpret Equation (4) from two distinct perspectives, both of which possess the same Separation Property: the neoclassical theory of reciprocal demand formulated by John Stuart Mill (1844) and the classical Ricardo's approach and its revival in Sraffa (1960).

Let us define the real wage rate, \overline{w}^{P} , \overline{w}^{e} , as the quantity of a single or composite good per unit of domestic labour and start from the neoclassical view. Let $X^{e}\left({}^{p_{x}}/{}_{p_{y}}, \overline{w}^{e}, r^{e}, Q_{x}^{e}, Q_{y}^{e}\right)$ denote the English import function of Portuguese wine. This function, which is supposed to exist, has domestic variables, but not the variables of the other country, according to the Separation Property. Furthermore, the rate of profit r^{e} is not variation-free, since it is associated with the cost minimizing choice of techniques and specialization, given the terms of trade ${}^{p_{x}}/{}_{p_{y}}$ and the home wage rate \overline{w}^{e} , as if England were a small economy trading with a large rest of the world. Let $X^p \left({{^p}_x}/{p_y}, \overline{w}^p, r^p, Q_x^p, Q_y^p \right)$ denote the export function of wine from Portugal, derived in the same way. Equilibrium on the wine market requires the equation:

$$X^{e}\left({}^{p_{x}}/p_{y}, \overline{w}^{e}, r^{e}, Q_{x}^{e}, Q_{y}^{e}\right) = X^{p}\left({}^{p_{x}}/p_{y}, \overline{w}^{p}, r^{p}, Q_{x}^{p}, Q_{y}^{p}\right)$$
(5)

The corresponding equation for the cloth market is implicit. The condition of balanced trade in value is:

$$p_{\chi}X^{p}(\cdot) = p_{\chi}Y^{e}(\cdot) \tag{6}$$

The model exhibits a classical characteristic, namely, the real wage rates attributed to institutional factors, and a neoclassical one due to the international relative price determined as an equilibrium in terms of import and export functions. This approach conforms to J.S. Mill's theory of reciprocal demand for the determination of the terms of trade. If $p_x X^p(\cdot) \neq p_y Y^e(\cdot)$ this is a sign of disequilibrium between demand and supply, which can be assumed to directly affect the relative price p_x/p_y .

In the Example, the directed quantities $X = X^{p \to e}$ and $Y = Y^{e \to p}$ are given, but the interpretation of the equation (4) is not that of a special case of (6). If (4) is violated, say because $p_X X^{p \to e} > p_y Y^{e \to p}$, this inequality signifies a potential loss for the Portuguese traders, who should deliver a higher value in exchange for a lower one. This would result in a decrease in the exchange of wine against cloth, and lead producers, who may be either distinct from traders or merged within the same agents, moving their capital away from their unprofitable domestic industry. The same inequality means a potential profit in the export of cloth against wine on the side of the English traders and a relocation of English capital at home. In a monetary economy with national convertible currencies, this outcome would manifest itself through the adjustment of the exchange rate between the two currencies, as well as the domestic interest rates.

7. Sraffa's price equations and the equation of balanced trade

The interpretation of the Example with its price equations suggests the construction of more general Ricardian models of international trade. Let us adhere to the method of given quantities adopted in the Example and in Sraffa (1960) and assume complete specialization of two countries producing m + n commodities: m produced in country I and n in country II. Assuming that wages are paid *ex ante factum*, Sraffa's price equations for the global economy become:

Where:

 A^{I} , A^{II} : *m* x *m* and *n* x *n* matrices of quantities of domestic inputs produced in countries I and II, respectively

 B^{I} , B^{II} : *m* x *m* and *n* x *n* matrices of quantities of domestic outputs produced in countries I and II, respectively

X, Y: m x n and n x m matrices of imported commodities

 l^{l} , l^{ll} : *m* and *n* column-vectors of labour requirements

 $p^{I}, p^{II}: m$ and n column-vectors of prices

w^I, w^{II}, r^I, r^{II}: wage rates and rates of profits in countries I and II, respectively.

A row of the matrices defined above corresponds to a process (or technique) and a column to a commodity. In particular, the element x_{ij} of matrix X denotes the quantity of commodity j, with j = m+1,..., n, produced in country II, imported by country I and used in process i, with i = 1,..., m. Similarly, the element y_{ij} of matrix Y denotes the quantity of commodity j, with j = 1,..., m, produced in country I, imported by country II and used in process i, with j = 1,..., m, produced in country I, imported by country II and used in process i, with j = 1,..., m.

The price equations must represent the absence of capital movements across the two economies, not only admitting two different rates of profits, but also by the condition of balanced trade. Assuming that the traded quantities are only used as means of production, the following equation in compact form must hold:

$$\operatorname{Sum}(\boldsymbol{X}, \boldsymbol{p}^{l}) = \operatorname{Sum}(\boldsymbol{Y}, \boldsymbol{p}^{l}), \qquad (8)$$

where $\text{Sum}(X, p^{II})$ is the total value of the quantities produced in country *II* and imported by country *I* for its production requirements. Likewise, $\text{Sum}(Y, p^{I})$ is the total value of the means of production imported by country *II*. The extensive form corresponding to the Sum notation is:

Sum
$$(\mathbf{X}, \mathbf{p}^{II}) = \sum_{i=1}^{m} \sum_{j=m+1}^{n} x_{ij} p_j$$
 and Sum $(\mathbf{Y}, \mathbf{p}^{I}) = \sum_{i=m+1}^{n} \sum_{j=1}^{m} y_{ij} p_j$

Equation (8) corresponds to and generalizes equation (4) of the Example. If foreign trade also includes commodities for non-intermediate use, (8) should be replaced with

Sum
$$(X, p'') + xp'' =$$
Sum $(Y, p') + yp'$, (9)

where x and y denote row-vectors of given quantities traded for those further requirements.

Along the lines of Sraffa (1960), let us set the total value of the net global product of the multinational economy equal to one and write the numéraire equation applying the Sum notation:

$$Sum(\mathbf{B}^{I}-\mathbf{A}^{I}, \mathbf{p}^{I}) - Sum(\mathbf{X}, \mathbf{p}^{II}) + Sum(\mathbf{B}^{II}-\mathbf{A}^{II}, \mathbf{p}^{II}) - Sum(\mathbf{Y}, \mathbf{p}^{I}) = 1 \quad (10)$$

The system (7) and (8) or (9), combined with equation (10), has m + n + 2 equations in m + n + 4 unknowns. Let us assume a positive surplus of each commodity in the global economy. We can fix two distributive variables within their respective feasibility range, leaving the other two endogenous. Notice that choosing the independent variables in system (7) cannot be arbitrary because the wage and profit rates cannot be fixed at the same time in the same country. The Separation Property and the Principle of Competition

require that each country choose its cost-minimizing techniques and specialization relative to parametric terms of trade and assuming only one of its distributive variables as given.

8. Constrained and unconstrained wage frontiers

A multidimensional wage frontier can be derived from (7) and (8) or (9) by taking one distributive variable for each country (either the wage rate or the rate of profits) as exogenous and relating the changes of the other two to the former. This analysis of comparative statics will not be elaborated upon herein. We observe that it is possible to draw also a multidimensional frontier between the distributive variables from the equations (7) dismissing the balance trade equation, but it would be wrong to say that the role of institutional factors in the distribution of the surplus increases beyond what holds in closed economies. The constraint of the trade balance cannot be neglected. There is only one new logical possibility that consists in selecting a given real wage rate in one country and a given profit rate in the other. This may suggest the possibility that two different country. However, it would be too hasty to claim that such a closure of the equations describes a possible dominance of a country over the other. A conclusion in this direction would require an extension of the model by at least the explicit introduction of money and finance with the related institutions.

9. A special case

The approach outlined above can generate different models of interconnected economies and specific closures of the price system. In particular, we can reformulate the price equations to describe the case in which the wage rate, say in country II, is reduced to a subsistence level. The equations (7) and (8) in this case become:

where \underline{A}^{II} and \underline{Y} denote the matrices of inputs augmented by the quantities of commodities required for the subsistence of the labour force. Either the wage rate or the profit rate in country I can be chosen as an exogenous variable, instead the profit rate in country II becomes a dependent variable. The same caveat mentioned at the end of the previous section warns against interpreting a point on the wage frontier as if it reflects a "balance of influence" among specific institutional factors, which are only announced without a theory behind them.

10. A sketch of research agenda

The equation of balanced trade in aggregated value is a necessary closure of the price equations to deal with two trading economies in the absence of capital movements. If we assume k countries with $k \ge 2$, the system of price equations for the global economy will be closed by k - 1 equations of balanced trade in aggregated value. However, the theorists of the surplus approach and contiguous Ricardian modelling of foreign trade¹⁰ have not adopted the form (8) or (9) of the balanced trade equation. I think there are two reasons why this equation has been relatively neglected in those early works and, to my knowledge, even in more recent developments of Ricardo's theory of growth and international trade: 1) the focus on the criticism of the neoclassical theory of international trade and 2) the difficulty in dealing with not linear models.

The focus of those analytical contributions was the extension of the criticism addressed to the neoclassical theory of foreign trade based on aggregate capital, and only a preliminary reconstruction along Ricardian guidelines. It has led to the creation of models of international trade based on two assumptions, which allow the analyst to by-pass the general equation of the balance of payments amongst two interconnected economies. The first is to build models of a small open economy avoiding feedback to the rest of the world. The second is to use classical saving functions and steady growth analysis. In my early works on Neo-Ricardian theories of international trade, I assumed steady growth of the trading economies and classical saving functions. This means that the workers do not save, while the capitalists save a given fraction of their profits. Steady growth of each country i, with i = I, II, at the rate g^i requires $r^i = g^i / s^i$ where s^i is the saving ratio out of profits. The condition of balanced growth $g^{I} = g^{II}$ with $r^{i} = g^{i}/s^{i}$, i = I, II, closes the system of the price equations and allows to derive a wage frontier between the wage rates of the two economies and the common rate of growth. Such a type of closure is useful to show a possible re-switching of the pattern of specialization and reversed capital deepening in the trading countries, but it is unduly restrictive for constructive purposes and conceals the general formulation based on the equation of balanced trade in aggregated value.

Another explanation for the of lack of a general account of the balance of payments in those contributions can be a certain analytical difficulty. If the profit rate is given in each of the interconnected countries, the price equations (7) and (8) or (9) preserve the linearity of the equations widely explored for a fully integrated economy with a given uniform profit rate. However, if we abandon the Ricardian-Sraffian method of given quantities and assume fixed input-output coefficients and endogenous quantities, then the equations (8), (9) introduce a special non-linearity into the price equations. The non-substitution theorem would still apply to the economy of each country who were supposed to choose its specialization relative to arbitrarily given international prices of tradable commodities in the model of single product industries, but even in this case it would not hold for the

¹⁰ See Parrinello (1970, 1973), Steedman (1979a, 1979b chapters 9 and 10).

global economy of interconnected countries. Consequently, the normal prices of such economy will depend on the quantities in demand.

Sraffa's equations reformulated above by the trade balance in aggregated value can be an introduction to Ricardian models of open economies with money and finance. If the initial prices p^{I} and p^{II} should be arbitrarily given, then little can be said about the adjustment of the global economy, unless the problem of numéraire dependence of the adjustment process is overcome by the explicit analytical inclusion of money and the exchange rates among national currencies. The equation of the trade balance, converted from absolute to money values, appears to be the main analytical bridge between the textbook distinction between the pure theory of international trade and the monetary theory of the balance of payments in the global economy.

11. Conclusions

A revised interpretation of Ricardo's Example has led to a reconsideration of its scope and to clarify the logical framework of the Ricardian theory of trade among interconnected nations. Finally, it can also serve to question the common belief that the theory of foreign trade, based on the law of comparative costs, is in contrast with the productivity and absolute costs approach adopted by Adam Smith in his theory of specialization. Morales (2011) cites the *Classical Rule of Specialization* as the principle unifying Adam Smith and Ricardo's theories of international trade. We think that both trade theories share a common principle because the Principle of Competition and the Classical Rule overlap. If we should allow international capital movements, this shared criterion would not be combined with the property of analytical separation, and so only one systemic choice of cost minimizing techniques and specialization would be at stake in such an integrated economy. In this case, it can be shown that, contrary to the law of comparative costs and according to a cursory insight found in Ricardo's Chapter on Foreign Trade, all capitalistic industries of a national economy might not be able to compete in the integrated market and would have to relocate abroad.¹¹

References

- Bellino, E., Fratini S. (2022) Absolute advantages and capital mobility in international trade theory, *The European Journal of the History of Economic Thought*, 29:2, 271-293, DOI: 10.1080/09672567.2021.1967418.
- Cairnes, J. E. (1874) *Some Leading Principles of Political Economy*. New York: Harper & Brothers Publishers.

¹¹ See Bellino, E., Fratini S. (2022).

- Gehrke, C. (2024) George Grote's manuscript essay on "Foreign trade", *The European Journal of the History of Economic Thought*, DOI:10.1080/09672567.2024.235755.
- Kurz, H.D., Salvadori, N. & Signorino R. (2024) Piero Sraffa and Counterfactuals: A view from Sraffa's unpublished papers in the late 1920, paper given at the 27th Annual Conference of the European Society for the History of Economic Thought in Graz, Austria, May 10, 2024.
- Maneschi, A. (2004) 'The True Meaning of David Ricardo's Four Magic Numbers.', Journal of International Economics 62 (2): 433–443. doi:10.1016/S0022-1996(03)00008-4.
- Mill, J. S. (1844) *Essays on some Unsettled Questions in Political Economy.* London: John W. Parker.
- Montani, G. (2011) 'The neo-Ricardian theory of economic integration', in Sraffa and Modern Economics, vol. II, edited by R. Ciccone, C. Gehrke and G. Mongiovi, 229-239. London & New York: Routledge.
- Morales Meoqui, J. (2011) Comparative Advantage and the Labor Theory of Value. *History of Political Economy*, 43(4), pp.743–763.
- Parrinello, S. (1970) 'Introduzione ad una Teoria Neoricardiana del Commercio Internazionale', *Studi Economici*, 267-321.
- Parrinello, S. (1973) 'Distribuzione, Sviluppo e Commercio Internazionale.', *Economia Internazionale* 26(2): 197–229. Abridged English version 'Distribution, Growth and International Trade', Ch. 14 in I. Steedman (Ed.) *Fundamental Issues in Trade Theory*. London: Macmillan, 1979.
- Parrinello, S. (1988) "On Foreign Trade" and the Ricardian Model of Trade', *Journal of Post- Keynesian Economics*, 10 (4): 585–601.
- Parrinello, S. (2022) 'On Some "New" Interpretations of Ricardo's Principle of Comparative Advantages.' *Centro Sraffa Working Papers*, no. 60, December 2022, Roma Tre University. <u>http://www.centrosraffa.org/centrosraffaworkingpapersSEARCH.aspx</u>. Forthcoming in M. Dal Pont Legrand and Sandye Gloria (eds), 40 Years of Economics through the Lenses of Historians of Economic Thought.
- Ricardo, D. (1817) On the Principles of Political Economy and Taxation. In: Sraffa, P. (Ed.). The Works and Correspondence of David Ricardo, Vol. I. Cambridge University Press, Cambridge, 1951.
- Ruffin, R.J. (2002) David Ricardo's discovery of comparative advantage.' *History of Political Economy*, 34(4), pp.727–748.
- Sraffa, P. (1930) 'An Alleged Correction of Ricardo', *The Quarterly Journal of Economics* 44 (3): 539–544. doi:10.2307/1885795.
- Sraffa, P. (1960) Production of Commodities by Means of Commodities. Prelude to a Critique of Economic Theory. Cambridge: Cambridge University Press.

Steedman, I. (ed.) (1979a). Fundamental Issues in Trade Theory. London: Macmillan.

- Steedman, I. (1979b). *Trade amongst Growing Economies*. Cambridge: Cambridge University Press.
- Tabuchi, T. (2017) 'Yukizawa's Interpretation of Ricardo's Theory of Comparative Costs', In *Ricardo and International Trade*, edited by S. Senga, M. Fujimoto, and T. Tabuchi, 48–59. New York: Routledge.
- Yukizawa, K. (1974) 'Ricardo Hikakuseisanhisetsu No Genkeirikai to Henkeirikai [The Original Meaning and Deformed Interpretation of Ricardo's "Theory of Comparative Costs"].' Shogakuronsan [Chuo University Journal of Commerce] 15 (6): 25–51.

Author contact information:

Sergio Parrinello University of Rome "La Sapienza" Rome (Italy) <u>srgparrinello@gmail.com</u>