Money and Foreign Trade in Ricardo (1809-1811) and in Ricardo (1817)
Jérôme de Boyer Des Roches

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

Of these two countries, if one had the advantage in the manufacture of goods of one quality, and the other in the manufacture of goods of another quality, there

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2 I would like to thank Alain Béraud, Lucy Brilliant, Gilbert Faccarello, Ricardo Solis Rosales and the participants of the H2M Phare seminar for their assistance and useful comments,
would be no decided influx of the precious metals in either; but if the advantage very heavily preponderated in favour of either, that effect would be inevitable.”

Ricardo, 1817, p. 142

1. Introduction

Over the past two centuries, the connection David Ricardo made between money and foreign trade was widely commented on the basis of the 1809-1811 writings, notably the High Price of Bullion, Proof of the Depreciation of Bank Notes, of the 1816 Proposals for an Economical and Secure Currency, proposals taken again in the chapter twenty seven “On Currency and Banks” of the 1817 Principles of Political economy an Taxation, and of the 1823 Plan for a National Bank. On the other hand, the chapter seven “On Foreign Trade” of the 1817 Principles was mostly ignored with the exception of J.W. Angell (1926), F.W. Taussig (1927), K. Kojima (1951), M. Blaug (1976), J. de Boyer (1992) et G. Faccarello (2013) who did pay attention to it. Yet, according to Ricardo, the concept of comparative advantage cannot be understood without studying the international distribution of precious metals, and the determination of the natural prices of wine and cloth. In other words, the determination of relative prices includes monetary mechanisms. However the chapter seven of the Principles did not simply resume the 1809-1811 Ricardo’s monetary ideas. Here, Ricardo used arguments he had criticized seven years before. Furthermore, he reconsidered the link between value of money and exchange rate.

The aim of this paper is to present and compare Ricardo’s monetary and foreign exchange analysis in the writings of 1809-1811 on one side, and in the chapter seven of his 1817 book on the other side. By means of a numerical example, the second section recalls the main features of the 1809-1811 analysis. According to Ricardo, the value of money in two trading countries must be equal for the foreign exchange equilibrium to be reached. Several notions such as the price specie flow mechanism, the quantity theory and the criticism of Thornton’s gold point mechanism are emphasized in this section. The third section presents the theory of the comparative advantage developed in chapter seven of the Principles; more than half of this text is consecrated to monetary components. Emphasis is
placed on the foreign exchange market, the price specie flow between countries, and also the dynamics of money prices and wages that led to international specialization. The fourth section studies first the disconnection established by Ricardo in chapter seven of the *Principles* between the values of currencies and exchange rates, and second then his comments relative to the bullionist controversy; these comments close the chapter. The fifth section provides some precisions on (1) the "magic numbers" – i.e. 80, 90, 120, 100 -, (2) on the assumptions made to obtain the money prices - i.e. £45, £50, £50, £45 -, so that the terms of trade/exchange are not indeterminate contrary to an opinion inherited from John Stuart Mill, (3) finally on the consequences of an “improvement in making” English wine.

Our research provides the following conclusions. First, Ricardo’s statement of the comparative advantage theory involves the monetary theory, specifically it presupposes the validity of the quantity theory. The specie inflow (outflow) in one country drops (increases) the value of money in this country. Secondly, according to the comparative advantage theory, “England would give the produce of the labour of 100 (English) men, for the produce of the labour of 80 (Portuguese)” (Ricardo, 1817, p; 135). It entails that the money price of the produce of 80 Portuguese men is equal to the money price of the produce of 100 English. It means that the money price of the produce of a given quantity of labour is 25% higher in Portugal than in England; i.e. that the value of a given quantity of money is 20% lower in Portugal than in England. Third, the specie flow between countries is not described with Hume’s price specie flow mechanism, but with Thornton’s gold points mechanism. Fourth, fixed exchange rate under gold standard does not involve gold has the same value in various countries. The symmetrical changes, in two countries, in the quantities of money, that lead to symmetrical changes in the values of money, do not modify the market prices of gold in any of these countries. To conclude, the seventh chapter of the *Principles* does not support Ricardo’s monetary view at the time of the Bullion Committee.
2. Price specie flow mechanism and foreign trade: Ricardo 1810-1811

*Autarchic equilibrium*

In 1810-1811, Ricardo resumed and deepened the price specie flow mechanism formulated first by Davis Hume (1752). Also, Ricardo developed the idea that the balance of trade, either surplus or deficit, is a monetary phenomenon. In these writings he did not refer yet to the comparative advantage; he will do it later, in 1817. Nevertheless, we suggest to study the 1810-1811 Ricardo’s monetary analysis of the balance of trade in the framework of the theory of foreign trade developed in 1817. For this purpose, and in order to get to the point, we introduce six assumptions below: (1) first, we substitute France for Portugal in order to facilitate the description of exchange rates mechanisms; (2) second we introduce the domestic goods - the brick whose transportation cost is prohibitive\(^3\) - in order to discuss the purchasing power of money; (3) third we suppose that the two countries have “precisely the same population, and the same quantity of land of equal fertility in cultivation, with the same knowledge too in agriculture”\(^4\) and in the manufacture, except for the brick n° 2; (4) Fourth, the level of the subsistence wage is the same in the two countries, so that the profit rate is 20% in both\(^5\); (5) Fifth, neither wine nor cloth is a wage-good; (6) finally, the international stock of precious metals amounts to 5,547,35 gold ounces and the quantity theory holds. The two countries use different monetary units: the legal price of the gold ounce is 98,20 fr in France and £3 17sh 10.5d in England giving 25,22 Fr/£ as the par of exchange rate. Taking into account 3.85% «expense of transportation» for gold\(^6\), the gold import point in France (gold export point from England) is 24,28 Fr/£ and the gold export point from France (gold import point in England) is 26,19 Fr/£.

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\(^3\) “Suppose now we have bricks, so bulky in proportion to value that cost of transportation is prohibitive.” Taussig (1927, p. 35)

\(^4\) Cf. Ricardo, 1817, p. 142.

\(^5\) Concerning the link between these hypothesis and Ricardo’s correspondence with Malthus in October 1816, cf. Ruffin (2002), p. 739

\(^6\) 3.85% = £5 : £130. Cf. Ricardo (1817, p. 148)
### Table 1

<table>
<thead>
<tr>
<th>Country</th>
<th>Quantity of labour</th>
<th>Quantity produced (100 liters)</th>
<th>Natural price, in Francs</th>
<th>Price of the quantity produced, in sterling</th>
<th>Quantity of gold ounces circulating</th>
<th>Purchasing power of the gold ounce</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>80</td>
<td>76.8 p.</td>
<td>1,134,90</td>
<td>45</td>
<td>924.56</td>
<td>0.0865</td>
</tr>
<tr>
<td>England</td>
<td>100</td>
<td>96 p.</td>
<td>450</td>
<td>1,155,70</td>
<td>115.57</td>
<td>0.0865</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Quantity of labour</th>
<th>Quantity produced (83.33 meters)</th>
<th>Natural price, in Sterling</th>
<th>Price of the quantity produced, in Sterling</th>
<th>Quantity of gold ounces circulating</th>
<th>Purchasing power of the gold ounce</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>80</td>
<td>60</td>
<td>76.8 b1</td>
<td>45</td>
<td>924.56</td>
<td>0.8653</td>
</tr>
<tr>
<td>England</td>
<td>100</td>
<td>100</td>
<td>450</td>
<td>1,155,70</td>
<td>115.57</td>
<td>0.8653</td>
</tr>
</tbody>
</table>

### Natural Prices and Wage Rates

- **r = 20%**
- French wage rate: \( w_{France} \), in Francs: 945.75 Frans
- French wage rate: \( w_{France} \), in Sterling: 37.5 Pounds
- English wage rate: \( w_{England} \), in Sterling: 37.5 Pounds

### Purchasing Power of the Gold Ounce

- In France: 0.8653
- In England: 0.8653

We have the autarchic equilibrium as follows:

- Although the two countries produce a different quantity of goods, the quantities of labour (240 men) necessary for the aggregate production in both countries are the same so that the values of the aggregate productions are identical. Therefore, since the quantities of money are also the same in both countries, i.e. 2.773,68 oz, the values of money are identical in France and in England.

Concerning the natural prices of aggregate productions, we have to distinguish prices expressed in gold – i.e. the gold prices - from prices expressed in the money of account – i.e. the Sterling and Franc prices.

- The natural gold price of the aggregate production in both countries is 2.773,68 oz
- The natural Sterling price of English production (EP) is £10.800. It is equal to the natural gold price of the English production multiplied by the Sterling price of gold:
2.773,68 oz / EP x £3 17sh. 10,5d. / oz = £10.799 19sh. 1d. / EP

- The natural Franc price of French production (FP) is 272.375 Fr. It is equal to the natural gold price of the French production multiplied by the Franc price of gold:
  
  2.773,68 oz / FP x 98,20 Fr / oz = 272.375,38 Fr / FP.

  Note that 272.375,38 Fr = £10.799 19sh. 1d. x 25,22 Fr/£.

- The money wages – “wages rated in money”⁷ - are also at the same level: 945,75 Fr in France and £37,5 in England [945,75 Fr = £37,5 x 25,22 Fr/£]

- The levels of natural prices of the first three goods – i.e. wine, cloth and brick n°1 “rated in money”⁸ - are also the same: 1.134,90 Fr = £45 x 25,22 Fr/£ for wine; 1.182,19 Fr = £46,88 x 25,22 Fr/£ for cloth; 113,490 Fr = £4,50 x 25,22 Fr/£ for brick n°1.

  The purchasing power of gold ounce on wages, wine, cloth and brick n°1- reciprocal of the wages, wine, cloth and brick n°1 rated in gold – are also the same.

- Only the brick n°2 “rated in money”, and the purchasing power of gold ounce on brick n°2, are distinct in the two countries [226,98 Fr / brick n°2 (= £9) in France ≠ £4,5 / brick n°2 in England]. The ounce of gold purchases 0,4326 brick n°2 in France whereas it purchases 0,8653 brick n°2 in England.

  The gap between the natural prices of the brick n°2 in the two countries is not due to a gap in the values of money in the two countries but in the natural values⁹ of the brick n°2. Because of the prohibitive transportation cost of the brick n°2 from England to France, the natural price of the brick in France remains higher than in England¹⁰.

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⁷ Ricardo (1817, p. 142)
⁸ idem
⁹ Ricardo uses the expression « real value » : “When commodities varied in relative value, it would be desirable to have the means of ascertaining which of them fell and rose in real value, ....” (Ricardo 1817, Chap 1, section vi, p. 43)
¹⁰ Note that the profit rate and the natural wage rate are the same in all sector of goods given in the table1, including the brick n°2
The price-specie flow mechanism

Let us consider the discovery of a gold mine in England which increases by 100% the English stock (5,547,36 oz instead of 2,773,68 oz) and by 50% the world stock (8,321,04 oz instead of 5,547,36 oz). This entails a decrease by 50% of the natural value of the gold ounce in England; the monetary wages and prices increase by 100%. In France, however, the natural value of the gold ounce does not vary because the quantity of gold within the territory remains constant; the monetary wages and prices remain unchanged. As a consequence, the relatively cheap gold ounce leaves England for France where gold is relatively dear:

“Gold and silver, whether in coin or in bullion, obeying the law which regulates all other commodities, would immediately become articles of exportation; they would leave the country where they were cheap, for those countries where they were dear…”(Ricardo, 1810, vol III, p.54).

In return for the gold exported to France, wine and cloth are imported from France, giving rise to English balance of trade deficit and French surplus:

“In return for the gold exported, commodities would be imported; and (…) what is usually termed the balance of trade …(is) against the country exporting money or bullion, …”(Ricardo, 1810, vol III, p.54)

As much as the quantity of gold symmetrically increases in France and decreases in England, the natural wages and prices goes up in France and down in England. The process lasts until the equality in the value of money in both countries is re-established. Such an equality is reached when natural wages and prices will have increased by 50% in France and decreased by 25% in England, in other words, when the value of money will have decreased by one third in France and increased by one third in England. Then the total stock of gold (8,321,04 oz) will have been distributed equally [50%-50%] between the two counties: 4,160,52 oz in England and 4,160,52 oz in France.

The establishment in England of a bank issuing convertible banknotes, for an amount of £10,800 (= 2,773,68 oz x £3 17sh. 10,5d), circulating beside and in addition to the
outstanding gold specie, is similar to the case of the discovery of a gold mine except for one point. It is similar as for the effects on the value of gold, which decreases in England. It then impacts France as predicted by the price specie flow mechanism. It is distinct insofar as in the end of the process, France has 4.160,52 oz and England has 1.386,83 oz, which means that the gold distribution in each country in fine is 75% for France and 25% for England. Then, if the new international stock of currency - 5.547,36 oz in gold + £10.800 in banknotes - with a total value of £32.400, is distributed equally between the two countries - worth £16.200 in each - the £10.800 in banknotes are exclusively in England. In this country, the banknotes which, when issued, were added to gold, finally were substituted for gold; gold which migrated to France, putting the English bank in liquidity risk. Hence the dangerousness of issuing banknotes\(^{11}\).

This scenario is avoided if the bank issues notes exclusively by buying gold, if it is prohibited to issue banknotes by granting credit\(^{12}\). In this case, banknotes are not added to the circulation of gold specie but substituted for it: gold leaves the circulation to join the bank cash reserve. The quantity of specie and banknotes does not increase, the value of gold (and banknotes) does not diminish, gold is not exported, etc... We have the essence of Ricardo’s (1823) *Plan for a National Bank*, thereafter of the *Currency Principle* that inspired the 1844 Bank of England charter act.

So, according to the price-specie flow mechanism analysis, the balance of trade is a monetary phenomenon. A trade deficit (surplus) is identified with the export (import) of money, and this export (import) of money is the consequence of a fall (rise) in its value. Moreover, this export (import) of money brings about a rise (fall) in the value of money which restores the balance of trade. At this point, it is worth to emphasize that fall and rise in the value of money mean fall and rise, respectively in England and France, in the purchasing power of gold ounces on wine, cloth, and bricks n°1 and n°2. Indeed, in the expression “price-specie flow mechanism”, the word “price” refers to the natural (monetary) prices of goods. Since the money of account prices of the gold ounce are fixed in England and France, every variation in the natural prices of goods expressed in Sterling

\(^{11}\) Cf. de Boyer (2003, 2013 - b)

\(^{12}\) loans granted to traders or government.
or Franc results exclusively from variation in the prices expressed in gold. These last vary with the quantity of money, not the Sterling and Franc prices of gold\textsuperscript{13}.

Another remark concerns the distinction between the nature and the cause of the balance of trade. To say that it is a monetary phenomenon does not mean that its cause is monetary. We have described the monetary process of adjustment of the balance of trade following monetary shocks – discovery of a gold mine or establishment of a bank – but the shock may be real. For example, consider that the French population, therefore the production, increases by 25%. The quantity of money being given, natural prices decrease by 20%. Of course this fall is not due to a fall in the natural value of wine, cloth and bricks, but to the rise in the value of gold. The purchasing power of gold increases in France whereas it did not change in England; gold becomes relatively cheap in England and relatively dear in France. It is exported from England and, in exchange, wine and cloth are imported. The cause of the disequilibrium is real, but its nature is monetary. The price specie-flow adjusting process is monetary. The flows of money and symmetrical variations in prices last until the equality of the value of gold in both countries is restored. The international distribution of gold is as follows: 55.6% for France and 44.4% for England; in proportion of the population and the value produced in both countries

\textit{Price-specie flow mechanism versus gold points mechanism}

Ricardo (1810-1811) resumes and deepens Hume’s analysis in order to refute Henry Thornton’s explanation of the exports and imports of gold\textsuperscript{14}. According to Thornton (1802), gold is exported from England to France when the exchange rate of the Sterling falls to the gold export point, i.e. 24.28 FR/£. And this may occur although the value of gold is the same in both countries. Furthermore, if the convertibility of English banknotes in gold is suspended, the market price of gold in England may rise above its legal price. A phenomenon that may occur though the price of gold does not vary in France and the value of gold remains at the same level in both countries.

\textsuperscript{13} A. Rosselli (2013, p. 870) develops a distinct view.
\textsuperscript{14} See de Boyer (2007, 2008)
Indeed suppose again the autarchic equilibrium defined above. There is no trade between the two countries, then no activity on the exchange market. Consider an export of £105 capital from England to France. This provokes the appearance of a supply of £105 and a demand for 2.648,10 Fr ( = £105 x 25.22 Fr/£) on the exchange market. Since there is no other supply or demand on the market, there is excess supply of Sterling and excess demand for Francs so that the exchange rate of the Sterling diminishes. When the exchange rate reaches the level 24.28 Fr/£, arbitragists supply 2.549,40 Fr to buy the £105. Thereafter (1) they exchange in a London bank the £105 for 100 guineas, which contain 26,966 oz; (2) they send the guineas in Paris; (3) sell them for 2.648,09 Fr ( = 26,966 oz x 98,20 Fr/oz), making un gain of 98,69 Fr. During this process, called “gold points mechanism”, gold circulate as a consequence of the level of exchange.

Now, if no London banks reimburse its debt in gold, but in inconvertible Bank of England notes, arbitragists go to the open market to buy gold with their £105. The competition between them provokes a rise in the market price of gold. This high price of bullion is therefore the consequence of the fall in the exchange rate of money, not in the natural\textsuperscript{15} value of money, or its purchasing power on wine, cloth and bricks. According to the gold points mechanism, the choice to export gold, and the high price of bullion, may occur though the value of money is not involved\textsuperscript{16}.

Ricardo rejects this analysis. According to him, export of gold and high price of bullion are proofs of the depreciation of bank notes, depreciation being understood as diminished purchasing power on goods caused by excess issues. His argumentation relies on the price-specie flow mechanism: the over-issue of inconvertible banknotes provokes a fall in the value of gold, causing an increase in the prices of goods and wages, as well as in the price of gold bullion, bringing about the export of gold and, finally a fall of the exchange rate:

\textsuperscript{15} Cf. supra footnote 9, p. 6

\textsuperscript{16} Furthermore, gold may be exported though its value is higher than abroad. Consider that the population, then the production, increase, so giving rise to an increase in the value of money, then to a balance of trade surplus, but at a moment where the export of capital is of higher scale.
“An increase of paper currency ... lowers the value of gold bullion but raises its money price. It is the fall in its value which causes its exportation, and therefore the fall of the exchange” (Ricardo, 1810, vol III, p.64, ft 1)

However, Ricardo fails to describe the market process that raises the price of gold, he does not succeed to integrate the exchange market in the price-specie flow mechanism. Yet, the analysis of this failure is not the subject of this article. For our purpose, it is sufficient to mention that Ricardo opposed the price-specie flow mechanism to Thornton’s analysis, which rests on the gold points mechanism.

3. **Gold points mechanism and comparative advantages: Ricardo 1817**

   **The comparative advantage**

   Now, let’s consider an improvement in making wine in France so that the production increases by half - 80 men produce 120hl instead of 80hl – and the natural price decreases by a third -756,60 Fr instead of 1.134,90 Fr; i.e. £30 instead of £45. And suppose that the cost of transportation of wine and cloth amounts to 1/9 of their price.

   France has the relatively greater advantage to specialise in the production of wine and England the smaller disadvantage to specialise in the one of cloth: 160 French men produce 240hl (instead of 220hl if we add the non specialized production of 80 French [80hl] and 100 English [100hl]) and 200 English produce 192p. of cloth (instead of 172,8p. if we add the non specialized production of 80 French [76,8p.] and 100 English [96p.]). Thanks to international specialisation, the aggregate production increases by 20hl of wine and 19,8p. of cloth, the production of bricks being unchanged.

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17 Cf. de Boyer (2013 – a)
Now, to be implemented, the specialisation supposes two conditions. First, we have the well-known conditions concerning the relative price of wine in cloth:

\[
0.64 \text{ p/hl} \left(= \frac{76.8 \text{ p}}{120 \text{ hl}}\right) < P_{\text{wine, cloth}} < 0.96 \text{ p/hl} \left(= \frac{96 \text{ p}}{100 \text{ hl}}\right)
\]

Second, the importations and exportations would be financially profitable. This involves a modification of the natural prices of wine and cloth in both countries. The cost of production of English wine must be higher than the import price in England of French wine, i.e. higher than the cost of production of French wine plus the transportation cost. The cost of production of French cloth must be higher than the import price in France of British cloth, i.e. higher than the cost of production of British cloth plus the transportation cost\(^\text{18}\). That is to say:

- For French wine imported in England:

\[
(80 \text{ men/vin} \times W_{\text{France}}) (1 + r_{\text{France}}) (1 + 1/9) \times 25.22 \text{ Fr/L} \\
< (120 \text{ men/vin} \times W_{\text{England}}) (1 + r_{\text{England}})
\]

\[
\iff \\
\frac{W_{\text{France}}}{W_{\text{England}}} \left(1 + r_{\text{France}}\right) < \frac{120 \text{ men/hl}}{80 \text{ men/hl}} \frac{1}{1 + 1/9}
\]

\[
\iff \\
\frac{W_{\text{France}}}{W_{\text{England}}} \left(1 + r_{\text{France}}\right) < 1.35
\]

\(^{18}\) Angell (1926) & Taussig (1927)
For English cloth imported in France

\[
(100 \text{ men/p.} \times \frac{W_{\text{England}}}{\text{£}}) (1+1/9) : 25.22 \text{ Fr/£} < \frac{100 \text{ men/p.} \times \frac{W_{\text{France}}}{\text{£}}}{(1 + r_{\text{France}})} < \frac{100 \text{ men/p.} \times \frac{W_{\text{France}}}{\text{£}}}{(1 + r_{\text{England}})}
\]

\[
\iff
\frac{100 \text{ men/p.}}{100 \text{ men/p.}} (1 + 1/9) < \frac{\frac{W_{\text{France}}}{\text{£}}}{\frac{W_{\text{England}}}{\text{£}}} \frac{(1 + r_{\text{France}})}{(1 + r_{\text{England}})}
\]

\[
\iff
1,11 < \frac{\frac{W_{\text{France}}}{\text{£}}}{\frac{W_{\text{England}}}{\text{£}}} \frac{(1 + r_{\text{France}})}{(1 + r_{\text{England}})}
\]

Therefore:

\[
(2) \quad 1,11 < \frac{\frac{W_{\text{France}}}{\text{£}}}{\frac{W_{\text{England}}}{\text{£}}} \frac{(1 + r_{\text{France}})}{(1 + r_{\text{England}})} < 1,35^{19}
\]

We have a continuum of equilibriums\(^{20}\), see for example table 3.

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19 In Negishi’s model (1982) inspired from Sraffa, in a framework deprived from money and thus also without monetary wages, and without transportation cost, wage rates are labelled in a unit of account and are the same in each country so that the spread of productivity engenders a gap of profit rate between countries. The condition of exchange is that the level of ratio of \((1+r_{\text{France}})\) to \((1+r_{\text{England}})\) – and not the ratio \(\frac{\frac{W_{\text{France}}}{\text{£}}}{\frac{W_{\text{France}}}{\text{£}}} (1+r_{\text{France}})\) to \(\frac{W_{\text{England}}}{\text{£}} (1+r_{\text{England}})\) – is between two limits defined by the ratios of quantity of labour required to produce the two goods. In our example, the condition of exchange in accordance with Negishi is \(1 < \frac{1 + r_{\text{France}}}{1 + r_{\text{England}}} < 1,5\). The equilibrium is determined only if this ratio is determined (Gandolfo, 1987). Building on a quote of Ricardo (1817, p.83) dealings with capital exports, Negishi uses this ratio as an indicator of risk aversion of English capitalists. Equilibrium thus depends on the degree of this aversion.

20 Because neither wine nor cloth is a wage-good, the changes in their natural value do not change the real wages, then the rate of profit remains at 20% in both countries.
Table 3

<table>
<thead>
<tr>
<th>e = 25,22 Francs / Sterling pounds</th>
<th>Wine hectoliter (100 liters)</th>
<th>Cloth piece (83,33 meters)</th>
<th>Brick 1 unity</th>
<th>Brick 2 unity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>France</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of labour</td>
<td>160</td>
<td>0</td>
<td>60</td>
<td>20 men</td>
</tr>
<tr>
<td>Quantity produced</td>
<td>240 hl</td>
<td>0</td>
<td>600 b1</td>
<td>100 b2</td>
</tr>
<tr>
<td>Natural price or production cost, en Francs</td>
<td>840,67</td>
<td>1,313,54</td>
<td>126,10</td>
<td>252,20</td>
</tr>
<tr>
<td>(-------, en Sterling)</td>
<td>33,33</td>
<td>52,08</td>
<td>5,00</td>
<td>10,00 Pounds</td>
</tr>
<tr>
<td>Price of the quantity produced, in sterling</td>
<td>8 000</td>
<td>&gt;</td>
<td>3 000</td>
<td>1 000 Pounds</td>
</tr>
<tr>
<td>Natural price of imported cloth, in francs</td>
<td>1 167,59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural price of imported cloth, in sterling</td>
<td>46,30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of gold ounces circulating</td>
<td>2054,57</td>
<td>770,46</td>
<td>256,82</td>
<td>3 081,86</td>
</tr>
<tr>
<td>Purchasing power of the gold ounce</td>
<td>0,1168</td>
<td>0,0841</td>
<td>0,7788</td>
<td>0,3894</td>
</tr>
<tr>
<td><strong>England</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of labour</td>
<td>0</td>
<td>200</td>
<td>30</td>
<td>10 men</td>
</tr>
<tr>
<td>Quantity produced</td>
<td>0</td>
<td>192 p.</td>
<td>300 b1</td>
<td>100 b2</td>
</tr>
<tr>
<td>Natural price or cost of production, in Sterling</td>
<td>40,00</td>
<td>41,67</td>
<td>4,00</td>
<td>4,00 Pounds</td>
</tr>
<tr>
<td>Price of the quantity produced, in sterling</td>
<td>&gt;</td>
<td>8 000</td>
<td>1 200</td>
<td>400 Pounds</td>
</tr>
<tr>
<td>Natural price of imported wine, in sterling</td>
<td>37,04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of gold ounces circulating</td>
<td>2054,57</td>
<td>308,19</td>
<td>102,73</td>
<td>2 465,49</td>
</tr>
<tr>
<td>Purchasing power of the gold ounce</td>
<td>0,1051</td>
<td>0,0935</td>
<td>0,9734</td>
<td>0,9734</td>
</tr>
</tbody>
</table>

\[
r = 20\%
\]

French wage rate: eW_{France}, in Francs | 1050,83 | Francs |

French wage rate: eW_{France}, in Sterling | 41,67 | Pounds |

English wage rate: eW_{England}, in Sterling | 33,33 | Pounds |

Quantity of gold in France | 3 081,86 | ounces | 55,56% |

Quantity of gold in England | 2 465,49 | ounces | 44,44% |

The conditions (1) and (2) are verified:

\[
(1) \quad P_{\text{wine, cloth}} = \frac{\£33,33}{\£46,29} = 0,72 \text{ in Paris} ; \quad P_{\text{wine, cloth}} = \frac{\£37,04}{\£41,67} = 0,89 \text{ in London}
\]

\[
(2) \quad \frac{eW_{\text{France}}}{eW_{\text{England}}} \frac{(1 + r_{\text{France}})}{(1 + r_{\text{England}})} = 1,25
\]

For international exchange to take place, the monetary wage rates have to rise in France (they increase from 945,75 frs to 1050,83 frs – from £37,5 to £41,67) and fall in England (they decrease from £37,5 to £33,33) so that the price of cloth in England drops/falls (from £46,88 to £41,67), making it an exportable good to France where the production cost of cloth has increased (from £46,88 to £52,08). Consequently:

✓ The price of wine has increased in France (from 756,60 Fr [= £30] to 840,67 Fr [= £33,33] and decreased in England (from £45 to £37,04).
The price of cloth has decreased in France (from 1.182,19 Fr [= £46,88] to 1.167,59 Fr [= £46,30]) and in England (from £46,88 to £41,67).

Therefore, the relative price of wine in cloth has risen in France (from 0,64 [=£30/£46,88] to 0,72 [=£33,33/£46,30]) and dropped in England (from 0,96 [=£45/£46,88] to 0,89 [=£37,04/£41,67])

The prices of bricks n°1 and n°2 have increased in France (from 113,49 Fr [= £4,5] to 126,10 Fr [= £5] for the first and from 226,98 Fr [= £9] to 252,20 Fr [= £10] for the second) and decreased in England (both bricks from £4,5 to £4).

The price of the aggregate production increases in France (from 272.376 Fr [=£10.800] to 302.639 Fr [= £12.000]) and decreased in England (from £10.800 to £9.600)

These prices variations involve that 308,19 ounces of gold has transited from England to France, incurring:

A new quasi-parity - except for the transport costs - of its purchasing powers:

- on wine : 0,1168 hl/oz in France and 0,1051 hl/oz in England
- and on cloth 0,0841 hl/oz in France and 0,0935 p/oz in England.

The appearance of a disparity of the purchasing power of gold on brick n°1 : 0,7788 b₁/oz in France and 0,9734 b₁/oz in England whereas it was before 0,8653 b₁/oz in both countries

The increase of the disparity of purchasing power of gold on brick n°2 : 0,3894 b₂/oz in France and 0,9734 b₂/oz in England whereas it was before 0,4326 b₂/oz in France and 0,8653 b₂/oz in England

It is worth underlying that the new distribution of gold between the two countries – 44,4% / 55,6% instead of 50% / 50% - takes place even if the value of the aggregate outstanding goods circulating in each country did not vary, but the value of “utilité produite” , i.e. of utility produced:
“In the 7th Chap. of this work, I have endeavoured to shew that all trade, whether foreign or domestic, is beneficial, by increasing the quantity, and not by increasing the value of production. We shall have no greater value, whether we carry on the most beneficial home or foreign trade, or in consequence of being fettered by prohibitory laws, we are obliged to content ourselves with the least advantageous. The rate of profits, and the value produced, will be the same. The advantage always resolves itself into that which M. Say appears to confine to the home trade; in both cases there is no other gain but that of the value of an utilité produite.” (Ricardo, 1817, chap. XXII, “Bounties on Exportation”, p.319-20).

To sum up, technical progress makes the French wine an exportable good, the export of wine entails a transfer of gold between the countries that provokes symmetrical variations in the natural price of goods so that English cloth becomes an exportable good. These modifications of natural and relative prices caused by the transfer of gold have been widely neglected in the literature\textsuperscript{21}, except from Taussig (1917, 1918, 1929)\textsuperscript{22} and his pupils\textsuperscript{23}.

\textbf{The gold points mechanism}

Now, how does gold transit from England to France. Which mechanism prevails? To answer, one should admit that the price-specie flow mechanism is of no help. Indeed, before any adjustment, and as a result of technical progress in France, i.e. 80 men producing 120hl wine instead of 80hl, there are only two variables that have changed. On the one hand the natural price of the hectolitre of wine in France falls by a third, 756.60 Fr instead of 1.134.90 Fr. On the other hand the quantity of wine produced in France increased by half, 120 hl instead of 80hl. Therefore, before any adjustment, the price of the production of wine, and the quantity of gold ounces that circulate it, are unchanged:

\textsuperscript{21} K. Kojima (1951) is an exception
\textsuperscript{22} Cf. F. Sember (2010, 2013)
\textsuperscript{23} Cf. Notably Angel (1926)
120 hl x 756.60 Fr/hl = 90,792 Fr = £3.600 = 924.56 oz
80 hl x 1,134.90 Fr/hl = 90,792 Fr = £3.600 = 924.56 oz

It means/follows that the natural\textsuperscript{24} value of the ounce of gold is unchanged and that the lower natural price of wine is exclusively due to the decline/decrease in the natural\textsuperscript{25} value of wine. Because the value of money has not changed, Ricardo cannot rely on the price specie flow mechanism to explain the transfer of gold. The process he put forward is other.

The 33\% decrease in the natural price of wine in France, quite higher than the $1/9$ of transport cost, makes profitable the export of wine to England. This results in a supply of Sterling and demand for Francs on the foreign exchange market. Because the natural prices of cloth, equal in England and France, have not moved, there is no trade of cloth resulting in a supply of Francs and demand for Sterling. Because “\emph{every transaction in commerce is an independent transaction}”\textsuperscript{26}, at the par of exchange rate (25.22 Fr/£) there is an excess demand for francs (supply of sterling). This brings about a fall in the exchange rate of the Sterling which lasts until it reaches the gold export point (24.28 Fr/£). Then arbitragists demand Sterling and supply Francs to export gold from England:

“… the importer (...) would equally purchase a bill; but the price of that bill would be higher, from the knowledge which the seller of it would posses, that there was no counter bill in the market by which he could ultimately settle the transaction between the two countries; he might know that the gold or silver money which he received in exchange for his bill, must be actually exported to his correspondent (...), to enable him to pay the demand which he had authorized to be made upon him, and he might therefore charge in the price of his bill all the expenses to be incurred, together with his fair and usual profit.” (Ricardo, 1817, p. 139)

The causalities at work are those of the gold points mechanism criticised by Ricardo at the time of the Bullion Committee. The import of French wine is not due at all to an export

\textsuperscript{24} Cf. supra footnote 9, p. 6  
\textsuperscript{25} Cf. supra footnote 9, p. 6  
\textsuperscript{26} (Ricardo, 1817, p. 138)
of gold, consequence of a decrease in its value in England or an increase in France. The import of French wine results in the issue of a bill of exchange that brings about a fall in the exchange rate, which results in the export of gold. Gold is exported to settle one independent transaction\textsuperscript{27}. Thus, in Chapter 7 of \textit{The Principles}, Ricardo uses the Thorntonian mechanism he rejected seven years earlier. Thornton described how gold was exported to settle one financial independent transaction.

\textit{Natural prices and law of supply and demand}

We just previously commented a possible equilibrium among a continuum of equilibria; one – cf. E3 – where the French wage rate is 25\% higher than the English rate. A comparative look at five possible equilibria illustrates the mechanisms at work.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|}
\hline
 & E 1 & E 2 & E 3 & E 4 & E 5 \\
\hline
\textit{\£Wfrance} / \textit{\£WEngland} & 1,111 & 1,2 & 1,25 & 1,3 & 1,35 \\
\hline
\textit{Wage rate: FrWFrance , in Francs} & 995 & 1,032 & 1,051 & 1,069 & 1,087 Fr \\
\textit{(.........................., in Sterling)} & 39,472 & 40,98 & 41,666 & 42,3913 & 43,085 £ \\
\hline
\textit{Quantity of gold ounces in France} & 2,920 & 3,025 & 3,082 & 3,135 & 3,187 oz \\
\hline
\textit{.................................} & % & 52,63\% & 54,50\% & 55,56\% & 56,52\% & 57,45\% \\
\hline
\textit{Wage rate: £Wengland, in Sterling} & 35,528 & 34,099 & 33,333 & 32,6087 & 31,9148 £ \\
\hline
\textit{Quantity of gold ounces in England} & 2,628 & 2,521 & 2,465 & 2,412 & 2,361 oz \\
\hline
\textit{.................................} & % & 47,37\% & 45,50\% & 44,44\% & 43,48\% & 42,55\% \\
\hline
\textit{P\textsubscript{wine} / P\textsubscript{cloth} in France} & 0,640 & 0,691 & 0,720 & 0,749 & 0,778 p / hl \\
\hline
\textit{P\textsubscript{wine} / P\textsubscript{cloth} in England} & 0,790 & 0,853 & 0,880 & 0,924 & 0,960 p / hl \\
\hline
\textit{P\textsubscript{wine} in France / P\textsubscript{cloth} in England} & 0,715 & 0,772 & 0,800 & 0,837 & 0,869 p / hl \\
\hline
\end{tabular}
\caption{Table 4}
\end{table}

Successive gold exports modify the distribution of gold in favour of France and against England. The result is an increase in the money wage in France, and a decline in England, which increases the rate ratio between French and English money wage rates. Consequently, the relative price of wine in cloth increases, in both countries. It brings

\textsuperscript{27} Gold is exported “to settle the transaction”. The reader can refer to de Boyer and S. Diatkine (2008) on the circulation of gold as an international means of payments.
about a demand for sterling (supply of francs) to buy English cloth, which reduces the excess supply of sterling (excess demand for francs) on the currency market. Which would be the rise of the relative price of wine in cloth so that the demand for English cloth (demand for sterling) balances the demand for French wine (supply of sterling)? In other words, which would be the rise of relative price of wine in cloth that ensures the return of the exchange rate to par\textsuperscript{28}? The answer lies in the price elasticity of demands for wine and cloth, i.e. in the preferences of French and English people\textsuperscript{29}. The stronger the preference for cloth, the closer equilibrium is to E1, i.e. the most favourable to England (the least favourable for France). The stronger the preference for wine, the closer equilibrium is to E5, i.e. the most favourable to France (the least favourable for England).

So, contrary to Smith’s market analysis, taken again by Ricardo in chapter 4 of the *Principles* – “On natural and Market Price”-, the law of supply and demand does not make market prices to converge towards natural prices that are set independently from the market process, but determines the natural prices. This provides a new and complementary perspective/look on Ricardo’s famous passage which states that: “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” (Ricardo, 1817, p. 133). Moreover, the forces of supply and demand determine not only the prices on all markets, but also the distribution of gold: “It is thus that the money of each country is apportioned to it in such quantities only as may necessary to regulate a profitable trade of barter” (Ricardo, 1817, p.140).

Other passages in chapter 7 of the Principles have the same content: cf. p. 137 (lines 4 - 9), p.138 (lines 4 - 6), p.140 (lines 26 - 27), p.141 (lines 16 - 17). However, if the terms used by Ricardo seem to echo those used 7 years ago when stating the price specie flow mechanism, they should not lead the reader to the error. Here, gold is not exported from England because it lost its value. Gold is exported as the means of payment of the bills of exchange issued to finance the importation of wine. Gold is exported because the exchange rate has fallen to the gold export point; because, on the exchange market, there is no

\textsuperscript{28} In fact “inside the gold points”.

\textsuperscript{29} The reader could refer to G. Faccarello (2013) who provides a discussion by Stuart Mill.
motive for the demand of sterling except the arbitrage described by the gold points mechanism.

4. Value of gold, level of the currency and exchange rate

Value of gold and exchange rate

The theory of comparative advantage developed by Ricardo postulates, for both countries, the convertibility of bank notes, thus the fixity of the market prices of gold. Using the gold points mechanism and the quantity theory, it leads to a non-intuitive result: at fixed exchange rates, following a technical progress in the production of only one good in a single country, France, the natural prices of all goods change. Three effects are at work. First, the “quantity of labour effect” reduces the price of wine in France. Secondly, the symmetrical “quantity of money effect” leads to a proportional rise of prices in France and fall in England. Third, the “substitution of importation for production effect” leads to lower the prices of cloth in France and of wine in England.

<table>
<thead>
<tr>
<th>Var. natural price (in %)</th>
<th>wine</th>
<th>cloth</th>
<th>bricks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>France</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Quantity of labour effect</td>
<td>- 33,33%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Quantity of money effect</td>
<td>+ 11,11%</td>
<td>+ 11,11%</td>
<td>+ 11,11%</td>
</tr>
<tr>
<td>. Substitution of importation for production effect</td>
<td></td>
<td>- 11,10%</td>
<td></td>
</tr>
</tbody>
</table>

The fall in the quantity of labour to produce wine in France explains the initial and proportional fall of its price. Then, the fall in the value of money in France following the

---

30 The natural prices are monetary prices in gold. Natural prices expressed respectively in Francs and in Sterling are determined by the produce of natural prices in gold, respectively in France and in England, by the price in Franc of gold (98,20 Fr / oz) for the firsts, and by the price in Sterling of gold (£3 17sh. 10,5d. / oz) for the seconds.
11.11% increase of its quantity leads to the rise in prices of both wine, cloth and bricks. Then, the substitution of English cloth import for French cloth production makes the price of cloth fall. Finally this last decreases by 1.24%.

<table>
<thead>
<tr>
<th>Var. natural price (in %)</th>
<th>wine</th>
<th>cloth</th>
<th>bricks</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Quantity of labour effect</td>
<td>- 11.11%</td>
<td>- 11.11%</td>
<td>- 11.11%</td>
</tr>
<tr>
<td>. Quantity of money effect</td>
<td>- 7.40%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Substitution of importation for production effect</td>
<td>- 17.69%</td>
<td>- 11.11%</td>
<td>- 11.11%</td>
</tr>
</tbody>
</table>

The rise in the value of money in England following the 11.11% decrease of its quantity provokes the fall in prices of both wine, cloth and bricks. Then, the substitution of French wine import for British wine production accentuates the fall in the price of wine in England. Finally this last decreases by 17.69%.

Stressing the symmetrical “quantity of money effect” on the value of money in the two countries – fall in France and rise in England - in the context of fixed exchange rate, Ricardo concludes:

“[The]\(^{31}\) value of money will not be indicated by the exchange; bills may be continue to be negociated at par although the prices of corn and labour should be 10, 20, or 30 per cent. higher in one country than another. Under the circumstances supposed, such a difference of prices is the natural order of things, and the exchange can only be at par, when a sufficient quantity of money is

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\(^{31}\) In Ricardo’s text, this sentence begins with «This higher value of money» although in the preceding paragraph Ricardo describes a fall in the value of money: “... the value of money will be lower, and the price of corn and labour will be relatively higher ...” (Ricardo 1817, p. 146). He should have written: “This lower value of money”. Sraffa does not mention this error.
introduced into the country excelling in manufactures\textsuperscript{32}, so as to raise the price of its corn and labour.” (Ricardo, 1817, p. 146).

In fact, according to Ricardo (1817, chap. 7), contrary to Ricardo (1809-1811), international gold standard does not mean that money has the same value in different countries.

“When each country has precisely the quantity of money which it ought to have, money will not indeed be of the same value in each, for with respect to many commodities it may differ 5, 10, or even 20 per cent, but the exchange will be at par.” (Ricardo, 1817, p. 147).

Now we have to be attentive. Indeed, when Ricardo writes “comparative value of money in different countries” (p. 147, lines 24-5) and “comparative value of … currencies” (p. 148, lines 10-1), he does not designate the comparative values of money “estimated in commodities”, but the exchange rate. It’s the same when he uses the term “depreciated” to qualify the state of “currency … during the last ten years” (p. 148, line 14-15), of “£130” (p. 148, lines 17-20), and of “money” (p. 149, line 31). Ricardo does neither refer to the natural\textsuperscript{33} value of gold – of money, currency or sterling -, nor its “comparative value … in any commodity” – i.e. its purchasing power on goods:

“In speaking of the exchange and the comparative value of money in different countries, we must not in the least refer to the value of money estimated in commodities, in either country. The exchange is never ascertained by estimating the comparative value of money in corn, cloth, or any commodity whatever, …” (Ricardo, 1817, p. 147, line 29)

“Level of the currency higher that it should be” and exchange rate

Now, how does Ricardo “ascertain” the exchange rate? His answer is “by estimating the value of the currency of one country, in the currency of another.” (Ricardo, 1817, p.

\textsuperscript{32} France in our example.

\textsuperscript{33} Cf. supra footnote 9, p. 6
It is astonishing. Indeed the value of the currency of one country in the currency of another being nothing else than the exchange rate, it would mean that the exchange rate is ascertained by ... the exchange rate. Ricardo’s statement reflects a difficulty that runs the last four pages of chapter 7 of the Principles which, it must be emphasized, are devoted to the bullionist controversy and which Ricardo concludes as follows:

“While gold is exclusively the standard in this country, money will be depreciated, when a pound sterling is not of equal value with 5 dwts. and 3 grs. of standard gold, and that, whether gold rises or falls in general value.” (Ricardo, 1817, p. 149).

This concluding sentence is the only passage where Ricardo explicitly refers to the market price of gold above the legal price. In the meanwhile he is silent about the subsidies for allies and capital transfers – i.e. essential elements of the controversy – and limits the discussion to the context of barter of his comparative advantage theory. On one hand Ricardo focuses on the absence of parity of purchasing power of gold in the context of convertible currencies (cf. supra), and in the other hand he focuses on the fall of the exchange rate where gold transfer is hindered. Thus considering a case where it is England which benefits from productive innovation, so that there is an excess demand for sterling, Ricardo writes:

“If England were the manufacturing country, and it were possible to prevent the importation of money, the exchange with France, Holland, and Spain, might be 5, 10, or 20 per cent. against those countries.” (Ricardo, 1817, p. 146).

Ricardo is right. If it were impossible to export gold from France to England, the arbitrage could not occur when the exchange rate is at the gold import point in England (gold export point from France): there are no supply of Sterling and demand for Franc which limits the increase in the exchange rate of the sterling to 3.85%, i.e. to the “expense

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34 See the annexe on the French and Spanish translations
35 dwts. means pennyweight ( = 24 grains). Therefore “5 dwts. and 3 grs.” = 123 grains = 7,9872 grams. The legal price of 123 grains is £1.
of transportation of gold” (cf. supra, p.4). However, there, Ricardo does not adopt the reasoning he developed seven years before, but that of Thornton. If the import of gold is not prevented, gold import occurs as soon as the exchange rate reaches the gold import point, so stabilizing the exchange rate at this level. The gold import is the effect – not the cause - of the rise of the exchange rate. If the import of gold is prevented, the exchange rate may rise above this level. There is nothing which supports the Ricardian bullionist view.

Another proposition seems to be closer to the bullionist view; According to Ricardo, an exchange rate of £100 for 25,7244 Francs, i.e. 2% above the par of exchange:

“… indicates that the level of currency is higher than it should be in France …, and the comparative value of … [French currency] …, and that of England, would be immediately restored at par, by abstracting from … [hers] …, or by adding to that of England.” (Ricardo, 1817, p. 148).

If we refer to our numerical example, this sentence means that the technical progress in the production of French wine has created an excess “level of currency” in England, and a deficit in France. In England the level of currency is 2.773,68 oz whereas it should be 2.465,49 oz; in France, the level of currency is 2.773,68 oz whereas it should be 3.081,86 oz. The reciprocal of this proposition is that the production cost of English cloth (£46,88) is higher than it should be (£41,67), and that the production cost of French cloth (£46,88) is lower than it should be (£52,08). It is an original result of the theory of comparative advantage. However, it supposes that only the trade of goods brings about demands and supplies on the currency market. Now suppose that it is an export of British capital instead of a technical progress in the production of French wine that brings about a fall of the exchange rate of the Sterling. Would Ricardo conclude that the level of currency is higher than it should be? We may wonder. If the answer is negative, twenty-thirty years later, the Banking School concluded the reverse: if the fall of the exchange rates reaches the British gold export point, the Bank of England has to passively furnish the gold to the arbitragists...

36 In Ricardo’s words: “in England £100 may purchase a bill, or the right of receiving … £102 in France” (Ricardo, 1817, p. 148)
37 Souligné par nous
without reducing its issue of banknotes. Again, the analogies of vocabulary should not lead the reader to the error. The notion of excess in “the level of the currency” at work here is distinct from the notion of excess quantity of money in the price-specie flow mechanism.

Ricardo gives a last argument in support of the bullionist view. Given a par of exchange between London and Hamburgh of £100 for 1.100 Florins, Ricardo asks how one could ascertain “whether English money has fallen, or Hamburgh money has risen” (Ricardo, p. 149) if the exchange rate drops to £100 for 846 Florins\(^{38}\)? To answer this question it is necessary, says Ricardo, to resort to a standard. He adds that the standard is gold, “the standard by which by law [the value of money] is regulated” (Ricardo, p.149). Then, he argues that if there is a difference in England between the market price of gold and the legal price - “a comparative difference between the value of money, and the standard” (Ricardo, p.149) -, one can conclude that the fall of exchange rate between London and Hamburg results from the depreciation of the English currency. Thornton’s Paper Credit did not conclude otherwise: the fall of the exchange is due to excess supply of Sterling on the exchange market and makes the market price of gold rise in London, not in Hamburg.

No element in the chapter 7 of the Principles supports the bullionist thesis according to which the fall of the exchange is the consequence of an increase in the price of gold, which is itself an evidence of an excess issues of banknotes, in other words, of a depreciation of (the purchasing power of) bank notes. Nowhere is advocated the use of the price specie flow mechanism to analyse the balance of payments. Instead, the theory of comparative advantage uses the gold points mechanism. One should wonder about the coherence between Ricardo’s approach of exchange rate in this chapter of the *Principles*, and his view in chapter 27, *On Currency and Banks*, inherited from the years 1809-1811 and the 1816 *Proposals for an Economical and Secure Currency*.

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\(^{38}\) In Ricardo’s words: “£130 English money .... for £100 Hamburgh money”, Ricardo, 1817, p. 149
4. Ricardo’s numbers

Ricardo’s numbers concern labour quantities - i.e. 80, 90, 120, 100 – and prices - i.e. £45, £50, £50, £45. In order to obtain these numbers with our model, we have to introduce the following hypothesis:

- first, the 80 French men produce 88.9 pieces of cloth instead of 76.8 pieces. The production of cloth by the 100 English men is unchanged (96 pieces).
- second, the quantity unit to measure wine is the pipe where 1 pipe = 1,3483 hl. Therefore 80 French men produce 89 pipes (= 120 hl) and 100 English men produce 74.17 pipes (= 100 hl)
- third, the quantity unit to measure cloth is “a certain quantity of cloth” (1 cq. =1,1236 p.). Therefore 80 French men produce 79.12 cq (= 88.9 p.) and 100 English men produce 89 cq (= 96 p.)
- fourth, the quantity of gold is 5.554.29 oz instead of 5.547.37 oz

<table>
<thead>
<tr>
<th></th>
<th>France</th>
<th>England</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wine</td>
<td>Cloth</td>
<td>Wine</td>
</tr>
<tr>
<td>Labour L</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Production Q</td>
<td>89 pipes 120 hl</td>
<td>79.12 cq 76.8 p</td>
<td>89 pipes</td>
</tr>
<tr>
<td>Labour L</td>
<td>100</td>
<td>100</td>
<td>120</td>
</tr>
<tr>
<td>Production Q</td>
<td>74.17 pipes 100 hl</td>
<td>89 cq 96 p</td>
<td>89 pipes</td>
</tr>
</tbody>
</table>

Table 5

France has an absolute advantage in the production of both wine and cloth, but France has the relatively greater advantage to specialize in the production of wine, and England has the smaller relatively disadvantage to specialize in the production of cloth. The two conditions for countries to specialise are:

39 “… suppose before … the price of a certain quantity of cloth were £45 …”, Ricardo, 1817, p. 138
40 With 5.547,37 oz the price of a pipe of wine in France and a certain quantity of cloth in England would be £44,944 instead of £45.
Ricardo’s hypothesis is \[
\frac{W_{\text{France}}}{W_{\text{England}}} \frac{(1+r_{\text{France}})}{(1+r_{\text{England}})} = 1,25
\]
. The second condition holds: 1,1245<1,25<1,35. Note that Ricardo has chosen the hypothesis where the condition of exchange is very favourable to England\(^42\). Taking into account our hypothesis of a 20% profit rate in both countries permits to determine the money wages rates and the natural prices of wine and cloth:

- £\(W\) in France = £ 41,72 ; £\(W\) in England = £ 33,38
- £\(P_{\text{wine}}\) in France = £ 45 ; £\(P_{\text{cloth}}\) in France = £ 50
- £\(P_{\text{wine}}\) in England = £ 50 ; £\(P_{\text{cloth}}\) in England = £ 45

Therefore the relative price of wine in cloth is 0,9 (=45£/50£) in France and 1,11 (=50£/45£) in England. The condition (1) holds: 0,89 < 0,9 for France and 1,11 < 1,2 for England. Again the condition of exchange is favourable to England\(^43\). To sum up, France specializes (160 men) in the production of 178 pipes of wine (14,83 pipes more than the total of autarchic productions) and England specializes (200 men) in the production of 178 cq of cloth (9,88 cq more than the total of autarchic productions). France exports 89 pipes of wine at £45(pipe, thus at a total price of £4.005. England exports 89 cq of cloth at £45/cq, thus at a total price of £4.005. Given the transport costs, France imports 80,1 cq of cloth and England imports 80,1 pipes of wine. Therefore:

\(^41\) Negishisi reaches the same result: \(p_1 = p_2 (=£45)\) if \(\frac{1+r_{\text{England}}}{1+r_{\text{Portugal}}}\) equals 0,8.

\(^42\) Cf. Blaug, 1968, p. 149

\(^43\) Concerning the alleged (by J.S. Mill) indeterminacy “of the division of the advantage” in Ricardo’s chapter seven, see Sraffa (1930)
➢ France consumes 80.1 cq of cloth instead of 79.12 cq in autarchy; the gain is 0.98 cq, it means £49

➢ England consumes 80.1 pipes of wine instead of 74.17 pipes in autarchy; the gain is 5.93 pipes of wine, it means £296.5.

The repartition of the gain of exchange is 14.2% for France and 85.8% for England.

However, Ricardo does not limit his example with this case and analyses the effect of an improvement in making English Wine:

“Now suppose England to discover a process for making wine, so that it should become her interest rather to grow it than import it. …

Thus suppose before the improvement in making wine in England, the price of wine here were £50 per pipe, …

Suppose that, after improvement, wine falls to £45 in England, …” (Ricardo, 1817, p.137-8).

This fall in the cost of production of English wine means that 100 men produce 89 pipes instead of 74.17. In this case, the two conditions for international specialisation are:

(1) \(0.89 \text{ cq/pipe } (\frac{79.12 \text{ cq}}{89 \text{ pipes}}) < P_{\text{wine,cloth}} < 1 \text{ cq/pipe } (\frac{89 \text{ cq}}{89 \text{ pipes}})\)

(2) \(1.2345 < \frac{W_{\text{France}}}{W_{\text{England}}} \frac{(1+r_{\text{France}})}{(1+r_{\text{England}})} < 1.125\)

The second condition cannot hold: 1.125 is not superior to 1.2345, but inferior. Therefore:

“Both countries would probably find it their interest to make their own wine and their own cloth; …” (Ricardo, 1817, p.140)

It was to demonstrate this result – i.e. how the specialisation ends - that Ricardo used the gold point mechanism we used in section 2 and 3 of this paper.
5. **Annexe: some translations in French and Spanish**

The French and Spanish translations of Ricardo’s text are good examples of Ricardo’s difficulty to “ascertain” the exchange rate or define depreciation of money.

**a. In speaking of the exchange**

“In speaking of the exchange and the comparative value of money in different countries, we must not in the least refer to the value of money estimated in commodities, in either country. The exchange is never ascertained by estimating the comparative value of money in corn, cloth, or any commodity whatever, but by estimating the value of the currency of one country, in the currency of another.” (Ricardo, 1817, p. 147)

Translation of Francisco Solano Contancio (1817), revised by Alcide Fonteyraud (1847)

« Jamais le taux du change ne peut être déterminé en comparant la valeur de l’argent avec celle du blé, du drap, ou de tout autre produit, mais il résulte de la comparaison entre la valeur de la monnaie d’un pays et la valeur de la monnaie d’un autre pays. » p. 113 from reed. by Christian Schmidt, Calmann-Lévy, Paris, 1970


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44 The is no coma J.M. Dent & Sons LTD edition (1965), p. 91
45 The is no coma J.M. Dent & Sons LTD edition (1965), p. 91

« On ne fixe jamais le taux de change en déterminant la valeur relative de la monnaie en blé, drap ou en toute autre marchandise, mais en estimant la valeur de la monnaie d’un pays en monnaie d’un autre pays. » p. 166, de l’ed. GF-Flamarion, Paris, 1992

Spanish translation by Juan Broc B., Nelly Wolf y Julio Estrada M.

“No podrá nunca determinarse el cambio por la estimación comparativa del valor del dinero en cereales, vestidos o cualquier otro artículo, sino mediante la estimación del valor de la moneda de un país, en comparación con la moneda de otro.” Fondo de Cultura Económica, México, p. 112

b. The meaning of the word depreciation

“Some … wish to confine the meaning of the word depreciation to an actual fall of value, and not to a comparative difference between the value of money, and the standard by which by law it is regulated.” (Ricardo, 1817, p. 149)

Translation of Francisco Solano Contancio (1817), revised by Alcide Fonteyraud (1847)

« D’autres … veulent n’appliquer le mot dépréciation qu’à une baisse de valeur, et non à une différence comparative entre la valeur de la monnaie et la mesure type d’après laquelle cette valeur est réglée par les lois. » p. 114 from reed. by Christian Schmidt, Calmann-Lévy, Paris, 1970


Spanish translation by Juan Broc B., Nelly Wolf y Julio Estrada M.

“Algunos ... desean confinar el significado de la palabra depreciación a una baja real del valor, y no a la diferencia comparativa entre el valor del dinero y el patrón por el cual legalmente se rige.” Fondo de Cultura Económica, México, p. 113

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