Some notes on Ricardo's market and natural rates of interest

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1. Introduction

1.1 This paper critically discusses one of the main accepted results of Ricardo's theory of money, that is the convergence process of the market rate of interest to the natural rate. Following Green's pioneer work (1982,1992) about the quantity theory of money in classical political economy, we maintain that some logical inconsistencies affect Ricardo's representation of the tendency of the market rate of interest to the natural rate.

According to Ricardo, exogenous changes in the supply of, or demand for money generate short-run changes of the money-prices ratio and the market interest rate, and permanent changes in the price level play the role of bringing them back to their natural values (the natural rate of interest being taken as a fraction of the natural profit rate).

It will be argued that Ricardo appears to set the convergence to the natural interest rate in the context of an inconvertible *fiat* money system, in which the concept of a natural *ratio* of the quantity of money to prices (for given velocity of circulation of money and volume of transactions) is consistent with different absolute levels of the latter. We will try to show that, particularly with regard to the case of an increase in the money supply, the convergence process envisaged by Ricardo is not free from some critical considerations about its internal coherence if one takes into due account what he conceives to be the specific inducement for the public to borrow a larger quantity of money at a lower interest rate—namely, an above normal difference between profit rate and interest rate.

1.2 In the second paragraph of the paper we'll briefly review the history of Ricardo's contributions on the depreciation of the English currency. The third and fourth paragraphs deal with, respectively, the concepts of 'natural' quantity of money and of 'natural' proportion between money and prices. This excursus will help us to

understand what is in our opinion the real purpose of Ricardo's analysis about interest rate. Ricardo primarily focuses on the negative effects stemming from the suspension of convertibility following the Bank Restriction Act of 1797 and on the need for such convertibility to be soon restored. The debate joined by Ricardo did not seem to have academic purposes, but political objectives (Rieter, 1998)[1].
In this perspective, the quantity theory of money, which however Ricardo accepted[2], and the analysis of the convergence process of the market interest rate to its 'natural' level seemed functional to the discussion of issues arising from the suspension of convertibility. Hence we believe it is possible to detect some logical inconsistencies in Ricardo's way of reasoning about, for instance, the existence of a natural rate of interest or the convergence towards it of the market interest rate – possibly arising from the fact that the goal of Ricardo in that context was not to provide a systematic overview of those topics, but rather use those arguments to discuss the effects of the abandonment of convertibility.

In the fifth paragraph we'll describe the concept of natural rate of interest in Ricardo and the convergence process of the market rate to its natural level, while in the sixth one we'll express some perplexities about that mechanism of convergence. Hence, in the seventh paragraph we'll derive some preliminary conclusions.

It should be stated that our discussion does not pretend to draw conclusive remarks on the subject. The purpose of this essay is simply to raise some doubts about Ricardo's conception of the convergence of the market interest rate to its natural level, a subject which in our view deserves to be further analyzed in all its complexity.

2. Ricardo's contributions on the depreciation of the pound sterling.

2.1 The Bank of England, founded in 1694, was a private institution with a monopoly on issuing banknotes and coins in London and in the surroundings of the British capital. Other private banks in London were concerned with further aspects of the banking business without holding the issuing power, while the banks outside

[1] "The debate was not – at least not primatily – an academic discussion; at stake were real and substantial political interests, not theoretical niceties. Ricardo and his comrades-inarms were out to put a stop to the activities of those who had the power to print and issue money, because they deeply distrusted them […]." (Rieter, 1998, p. 246). See on this Ricardo, when in the *Principles* he affirms: "Experience, however, shews, that neither a State nor a Bank ever have had the unrestricted power of issuing paper money, without abusing that power: in all States, therefore, the issue of paper money ought to be under some check and control." (Ricardo, 1951, Works, Vol. I, p. 356)
[2] See paragraph 3 in this paper.

the London area, the *Country Banks,* were granted to issue their own notes convertible in banknotes issued by the Bank of England and in gold[3].

In 1797, in England, banknotes convertibility was suspended by a law passed by the British parliament, the Bank Restriction Act, which remained in force until 1821, when convertibility was restored. Because of the Napoleonic Wars (1796-1815), England had to turn to gold to make large payments abroad, consisting of military spending and subsidies to the allies. In parallel, the internal circulation of notes was increased due to higher loans granted by the Bank of England to the state to finance major military expenditure. The direct consequence was the fall in the ratio of gold reserves to the stock of banknotes. The fear of a French invasion, according to some scholars, or, according to other interpretations, the fear that the Bank would remain with insufficient gold reserves to convert the notes, produced a run on the bank and led the British Parliament to suspend convertibility.

Under that scenario, the early nineteenth century years, during the Napoleonic wars, were marked by an intense debate on political economy, better known as Bullionist Debate, regarding the relationship existing among increases in prices, exchange rates and monetary aggregates. Moreover, two years after the Bank Restriction Act, there was a gradual increase in prices, and this increase occurred in the conditions of paper *fiat* currency, not convertible into gold.

Ricardo was mostly involved in monetary affairs from 1809 to 1813 and almost exclusively until 1815[4], at least in relation to his published works. In 1809 he sent to the Morning Chronicle the article *The Price Of Gold*, which opened a long controversy known as *Bullion Controversy*[5]. All his later writings, until 1811, generally referred to as the *Bullion Essays*, are an integral part of this debate. The *Bullion Controversy* looked into the causes of the increase in the market price of gold, in terms of pounds, above the brand price, set at £ 3 17 s. 101/2 d. (read: 3 pounds, 17 shillings and pence 101/2). The price of gold "began to rise in 1799, reaching £ 4. 6s. 0d. in

[33] "Until 1826 the Bank was the only body of more than six partners which might issue notes in England, but an act of that year restricted the monopoly to an area within sixty-five miles of London. In practice, the Bank enjoyed a complete monopoly of issue in London, as the London private bankers had all given up issuing notes before the end of the eighteenth century. Bank of England notes also circulated generally in Lancashire, but elsewhere there were only a small number, most of which were held by country bankers in order to facilitate transactions with London, and by way of a reserve. There circulated in the provinces a great number of notes of private banks having less than six partners and, after 1826, of a growing number of joint-stock banks. These notes formed the principal currency of the agricultural districts, but a great deal of industry and commerce was financed by bills of exchange"(Morgan, 1965, pp. 2-3) Cfr. inoltre al riguardo Arnon (1998; 2011)

[4] On the evolution of the contents of Ricardo works cf. Boffito, C., *Teoria della moneta. Ricardo, Wicksell, Marx*, Torino, 1973, Einaudi and the most recent Takenaga, S., *Theory of Money of David Ricardo: Quantity Theory and Theory of Value*, Lecturas de Economía No. 59. Medellín, julio - diciembre 2003, pp. 73-126

[5] For an overview on the Bullion Controversy cf., among the others, Arnon (1998) e Hayek (1991)

January 1801; and returned to near its normal level by 1804, remaining steady until late in 1808. But in 1809 it had again risen sharply, touching £ 4. 12s. 10 d. on 4 July."[6]

We should point out that in 1809, when Ricardo took part in the *Bullion Controversy*, money circulation in England consisted almost entirely of banknotes (Ricardo, 1951, Works, Vol. III, pp. 74-5; Green, 1998, p. 138). For this reason we can state, with Ricardo, that only when the circulation is made up of paper currency there could be, as we shall see later, an alteration of the market price of gold in sterlings compared to the mint price - regardless of whether banknotes are convertible into gold or not.

This is a key point in Ricardo's analysis because, as we shall see, the English economist will focus on the difference between the market price of gold in sterling and the mint price in the event that paper money circulation is predominant in the system. Moreover, as mentioned above, from 1797 to 1821 the *Bank Restriction Act* suspended the convertibility.

2.2 Ricardo expressed his ideas in a more complete form in the brochure entitled *The High Price Of Bullion*, also published in 1809. The effect of this publication was the appointment of a parliamentary committee, the Bullion Committee, with the task of presenting a report "to inquire into the causes of the High Price of Gold Bullion."[7]

The Bullion Report, published in 1810 with the results of the Committee investigations, received most of the ideas of Ricardo. The controversy about the causes of the increase in the price of gold intensified after the publication of the Bullion Report and Ricardo took part at first sending three letters to the Morning Chronicle, and later with a polemical pamphlet against the main critic of the Bullion Report, C. Bosanquet.[8]

After the Bullion Controversy, the other writings of Ricardo about money were mainly devoted to regulatory proposals for the defense of the stability of the currency exchange value. Among these, the most important ones are the *Proposals for an Economic and Secure Currency* published in 1816 and the *Plan For the Establishment of a National Bank* published posthumously in 1824. These essays have some significance

[6] Sraffa, P.: *Note On The Bullion Essays*, in Ricardo, D., *Works*, Vol. III, 1951, pp.3-4
[7] Sraffa, P.:, *ibid*, pag. 8
[8] Ricardo, D.: *Reply To Mr. Bosanquet's Practical Observations on the Report of the Bullion Committee*, London 1811, in *Works*, 1951, Vol. III, pp. 155-256.

as the proposals contained in them were largely accepted by the English bank legislation and later on in other countries, and influenced substantially the evolution of the theory of money. Further, we will also consider Chapter XXVII of the *Principles*, "On Currency and Banks" to the extent to which it contains a synthesis of Ricardo's ideas on money.

3. The 'natural' quantity of money and the theory of value.

3.1 As pointed out by De Vivo (1987, p. 9), Ricardo conceived money purely as a medium of exchange. In the *Principles* we read in fact: "Productions are always bought by productions, or by services; money is only the medium by the exchange which is effected ". (Ricardo, 1951, Works, Vol. I, pp. 291-2). In his "*Theories of Surplus Value*" even Marx remarks that the main characteristic of money, according to Ricardo, was to be "[...] an intermediary in the exchange of products" (Marx 1862-3, *Theories of Surplus Value*, vol. II, p. 501).

Furthermore in Ricardo's conception money is not to be kept distinct from other goods. He believed that money - when it was to coincide with gold or silver or was similarly engaged to them via some form of convertibility - was nothing more than a commodity used as standard of values:

> "There does not appear to me to be any substantial difference between bullion and any other commodity, as far as regards the regulation of its value, and the laws which determine its exportation or importation. It is true that bullion, besides being a commodity useful in the arts, has been adopted universally as a measure of value, and a medium of exchange; but it has not on that account been taken out of the list of commodities." (Ricardo, *Works*, Vol. VI, pag. 24)

Hume's theory of the exchange value of money was dominant at the time when Ricardo wrote (Boffito, 1978). That theory opposed that of the mercantilists - who considered commodity money as the main form of wealth – and gave great importance to the sectors producing for the international market for their capacity to achieve trade surpluses and therefore to accumulate gold.

Hume argued instead that the function of money is only to be a medium of exchange (Green 1998, p. 136; Arnon, 2011)[9], and that at every stage of the

[9] Hume (1752, "Of Money", pag. 33**)**: "Money is not, properly speaking, one of the subject of commerce; but only the instrument which men have agreed upon to facilitate the exchange of one commodity for another. It is none of the wheels of trade: It is the oil which renders the motion of the wheels more smooth and easy. If we consider any one kingdom by itself, it is evident, that the greater or less plenty of money is of no consequence; since the prices of commodities are always proportioned to the plenty of money […]."

development of wealth and commerce of a nation there is a certain amount of commodity money – gold or notes convertible in gold – required to circulate the existing goods, compatible with the stability of their prices. An excess of money, for Hume, is therefore harmful because it would cause an increase in prices.

According to Hume, the relative value of money is determined by the opposition of the mass of commodities in circulation to the amount of circulating money. "It is the proportion between the circulating money, and the commodities in the market, which determines prices." (Hume, 1752, p. 43). In Hume writings ther does not seem to be any indication of the process by which prices would be raised by the increase of the quantity of money. We will see later on how, according to Ricardo, there is instead a specific mechanism which explains the variations of prices following a change in the quantity of money in circulation.

Hume also believes that an increase in the quantity of money with respect to circulation requirements generates the import of foreign goods, which become more competitive, and at the same time involves a drain of gold that will continue as long as the reduction in the quantity of circulating money will cause a fall in the price level. The amount of money adequate to the needs of commerce of a country is therefore the one existing in circulation when its external trade is balanced (Boffito, 1978, p.). According to Boffito (1978) Ricardo was strongly influenced by Hume, whose theory must be taken into account. Boffito (1978) again states that in the two essays of Hume *On money* and *On interest* one can find almost all the principles later established by Ricardo in *The High Price of Bullion* and in his last monetary writings.

3.2 An interpretation which can be traced back to Marx (1859, p. 171) and which highlights the difference between Hume and Ricardo - and that we subscribe to – maintains instead that Ricardo and, more generally, the classical economists, diverge from Hume in respect to the quantity theory of money (cf. Green, 1982, 1992, 1998; Laidler, 1975; Blaug, 1985; de Vivo, 1987). According to that interpretation, the classics conceived money - coinciding with gold or hooked to it by some form of convertibility - as a commodity, whose exchange value was explained according to the theory of value adopted (Petty, 1963, Vol. I: 43-4; Smith, *WN*, I. VI.1; Ricardo, *Works*, Vol. I, p. 352; Vol. III, p. 51; Green 1998, p. 137).

Hence classical economists believed that the amount of commodity money required for the circulation, in the long run, was determined by the value of gold relative to the other goods, as well as by the velocity of circulation and the volume of transactions (see on this Green 1982, p. 63)[10].
In other words, since gold was the commodity chosen as the standard[11] the *price level of goods in terms of gold* would be determined by the circumstances which regulate the relative price of gold .

Therefore, on the basis of the relative price system, the velocity of circulation and the volume of transactions, it is possible to detect, within the analysis of the classical economists, a concept of 'natural' quantity of money[12], associated with natural relative prices and the natural rate of profit (Green 1998, p. 137).
A similar approach might seem in conflict with the quantity theory of money - especially in Hume's formulations - which on the other hand was accepted by classical economists too. The idea of a commodity money implies that the amount of money necessary to circulate goods is in the long run determined logically after the price level, with the latter expressed in terms of a commodity chosen as a standard, on the basis of the conditions mentioned above.[13] However classical economists- and in particular Ricardo - used the quantity theory of money to explain "temporary" or "short run" changes in the price level (Green, 1998, p. 137; Nell, 2011, p. 186)[14],

[10] "[…] the classical "law of monetary circulation" […] is sometimes presented as or confused with the quantity theory of money. In fact, the direction of causation it suggests is precisely the reverse. According to this law, the quantity of money in circulation is dependent upon the level of output and prices – not the other way round – […]." (Green, 1992, pag. 56)

[11] Ricardo explains his meaning of "standard" in his 1815 essay *Proposals for an Economical and Secure Currency*: "It was the comparative steadiness in the value of the precious metals, for periods of some duration, which probably was the cause of the preference given to them in all countries, as a standard by which to measure the value of other things. A currency may be considered as perfect, of which the *standard* is invariable, which always conforms to that standard, and in the use of which the utmost economy is practiced (Ricardo, 1951, *Works*, Vol. IV, pp. 55-56, italics added). See also Ricardo, 1951, *Works*, Vol. I, p. 149

[12] Still in *Proposals for an Economical and Secure Currency* of 1815, Ricardo is rather clear when defining the determinants of the 'natural' level of the quantity of commodity money: "The quantity of metal, employed as money, in effecting the payments of any particular country, using metallic money; or the quantity of metal for which paper money is the substitute, if paper money be partly or wholly used, must depend on three things: first, on its value;—secondly, on the amount or value of the payments to be made;—and, thirdly, on the degree of economy practised in effecting those payments." (Ricardo, 1951, *Works*, Vol. IV, pp. 55-56)

[13] For a different view, if compared to the one used here, of the concept of 'natural' quantity of money in Ricardo cf. Marcuzzo (1994); Marcuzzo and Rosselli (2015); Deleplace (2015); Quadrio Curzio (2015).

[14] For instance Green says that "[…] the classical analysis of the relationship between money and prices is fundamentally different from the quantity theory […]. In this analysis, prices as well as output are determined independently of changes in the money supply, with modifications to this principle only in the *short-run*." (Green, 1992, p. 51) Green himself, in describing the 'short-term inflationary process' in the analysis of Ricardo says that "his account of inflation was mainly concerned with the process by which a long-run "equilibrium" position was restored after a temporary monetary disturbance". (Green, 1992, p. 85)

in the face of given velocity of circulation and production levels[15]. As a consequence of these changes in prices, Ricardo viewed the *price specie flow mechanism* as the process bringing back the quantity of commodity money to its 'natural' level, and the money prices to the level preceding the increase in money circulation.

As we shall see later, according to Ricardo a similar return of the amount of money to the 'natural' level is possible only in the case when its amount in circulation coincides with gold, or is hooked to it via some form of convertibility, i.e. in the case of a commodity money; viceversa, if in the economic system a *fiat* money circulates, what is possible to identify is no longer a 'natural' quantity of money[16], but only a natural proportion compatible with several amounts of *fiat* money and corresponding levels of money prices. This distinction between natural amount of money and natural proportion between money and prices will be particularly relevant in the discussion we are going to make of the convergence of the market interest rate to its natural level in Ricardo's analysis.

The "classical" approach, as outlined above, to the natural quantity of money is to be found in Ricardo's *Principles* (1817) in which he formulates a theory of value based on embodied labour and where he relegates the notion of scarcity to the prices of non-reproducible goods[17]. In his previous writings Ricardo had a different view. In particular, in the *The High Price Of Bullion* of 1809, he says:

> "Gold and silver, like other commodities, have an intrinsic value, which is not arbitrary, but is dependent on their scarcity, the quantity of labour bestowed in procuring them, and the value of the capital employed in the mines which produce them." (Ricardo, 1951, *Works*, Vol. III, pag. 51)

[15] Ricardo did not deny, in principle, that the velocity of circulation of money could vary (Ricardo, 1951, Works, Vol. III, p. 274). These changes, however, were the result of the development of the banking system and the public's habits, i.e. elements that produce their effects over relatively long periods. As for the effects on production levels of variations in the quantity of money, Ricardo believes that they are only temporary and, in particular, related to temporary delays in the adjustment of money wages to the price level (see. on this point De Vivo, 1987, p. 7; Ricardo, 1951, *Works*, Vol. VI, pp.16-7 and later in this essay).

[16] Although in a quite different view from the one referred to in the text, cf. Marcuzzo (1994), who says: "If the price of the standard is not fixed […], the quantity of money is no longer self-adjusting and the concept of a "natural" level becomes meaningless." (Marcuzzo, 2002, p. 181)

[17] "There are some commodities, the value of which is determined by their scarcity alone. No labour can increase the quantity of such goods, and therefore their value cannot be lowered by an increased supply. Some rare statues and pictures, scarce books and coins, wines of a peculiar quality, which can be made only from grapes grown on a particular soil, of which there is a very limited quantity, are all of this description. Their value is wholly independent of the quantity of labour originally necessary to produce them, and varies with the varying wealth and inclinations of those who are desirous to possess them.
These commodities, however, form a very small part of the mass of commodities daily exchanged in the market." (Ricardo, 1951, *Works*, Vol. I, pag. 12). Cf. also on this De Vivo (1987, pag. 7).

As emphasized by Boffito (1978), here Ricardo defines an intrinsic value in quite vague terms as determined by circumstances other than those indicated in the *Principles*, which contains an element in principle consistent with the theory of the exchange value of money adopted 'by the most approved writers on political economy' (Ricardo, Works, Vol. III, p. 52), in particular Hume. Indeed in the passage quoted above the exchange value between goods and money depends on their scarcity and, therefore, on their quantities, in addition to the technical conditions of production ("the quantity of labor bestowed to procure them")[18].

Despite a certain vagueness that characterizes this initial approach of Ricardo to the study of the determinants of value, we can find in these early writings the origin of the concept of a 'natural' quantity of money. A mention is made by Ricardo in his essay *The High Price Of Bullion* in 1809:

> "The precious metals employed for circulating the commodities of the world, previously to the establishment of banks, have been supposed by the most approved writers on political economy to have been divided into *certain proportions* among the different civilized nations of the earth, according to the state of their commerce and wealth, and therefore according to the number and frequency of the payments which they had to perform. While so divided they preserved everywhere the same value, and as each country had an equal necessity for the quantity actually in use, there could be no temptation offered to either for their importation or exportation." (Ricardo, *Works*, Vol.III, pag. 52; italics added)[19]

> "The only proof which we can possess of the relative cheapness of money in two places, is by comparing it with commodities. Commodities measure the value of money in the same manner as money measures the value of commodities. If then commodities will purchase more money in England than in France, we may justly say that money is cheaper in England, and that *it is exported to find its level*, not to destroy it." (Ricardo, 1951, *Works*, Vol. III, pp. 104-105; italics added)

and in *Reply To Mr. Bosanquet's Practical Observations on the Report of the Bullion Committee* of 1811:

> "Let us suppose that the circulation of all countries were carried on by the precious metals only, and that the proportion which England possessed were one million; let us further suppose, that, at once, half of the currencies of all countries, excepting that of England, were suddenly annihilated, would it be possible for England to continue to retain the million which she before possessed? Would not her currency become relatively excessive compared with that of other countries? […]. Suppose again the case reversed, and that all other currencies remained as before, while half of that of England was retrenched. If the coinage of money at the Mint was on the present footing, would not the prices of

[18] At this stage of Ricardo's thinking it could be difficult to establish whether the effects on the relative value of gold generated by any change in the amount of it are temporary or permanent, because in that face Ricardo viewed the relative value of goods depending also on their quantity.

[19] "I have uniformly maintained that the money of the world is distributed amongst the different countries according to their commerce and payments, and that if in any country it should from any cause happen to exceed that proportion, the excess would infallibly be exported to be divided amongst the other countries." (Ricardo, 1951, Works, Vol. VI, pp.74-5)

> commodities be so reduced here that their cheapness would invite foreign purchasers, and would not this continue till the relative proportions in the different currencies were restored? If such would be the effects of a diminution of money below its *natural* level, and that such would be the consequences the most celebrated writers on political economy are agreed, how can it be justly contended that the increase or diminution of money has nothing to do either with the foreign exchanges, or with the price of bullion?" Ricardo (1951, *Works*, Vol. III, pag. 192; italics added)

In the first passage quoted by *The High Price of Bullion*, the "certain proportions" referred by Ricardo can be interpreted as the 'natural' quantities of money for the various countries – Ricardo talks about precious metals, meaning at this stage the commodity money – which depend on the "state of their commerce and wealth, and according to the number and frequency of the payments which they had to perform": this synthetic expression encloses both the volume of transactions and the velocity of circulation of money, that is, the "real" needs of the economic system.

The same applies to the second passage of *The High Price Of Bullion*, where Ricardo speaks about the *price species flow mechanism* which we mentioned talking about Hume[20]. According to Ricardo, if in England an increase in the price level occurs following an increase in the amount of commodity money in circulation - meaning by this an increase in the quantity of money above the 'natural' level - such excess amount will be exported to buy foreign goods, which are less expensive than the English ones. This flow of money outside of British borders will enable the quantity of money in England to 'find its level', that is to return to its 'natural' level.
Finally, Ricardo specifically speaks of a 'natural' quantity of money in the last mentioned passage, in the event the quantity of commodity money is reduced below its 'natural' level.

In the *Principles*, where Ricardo developed the labour-value theory, it becomes clearer the 'long period' link between the quantity of money-commodity and the relative price system:

> "Gold and silver, like all other commodities, are valuable only in proportion to the quantity of labour necessary to produce them, and bring them to market. Gold is about fifteen times dearer than silver, not because there is a greater demand for it, nor because the supply of silver is fifteen times greater than that of gold, but solely because fifteen times the quantity of labour is necessary to produce a given quantity of it. *The quantity of money that can be employed in a country must depend on its value*: if gold alone were employed for the circulation of commodities, a quantity would be required, one fifteenth only of what would be necessary, if silver were made use of for the same purpose." (Ricardo, 1951, *Works*, Vol. I, pag. 352, italics added)

[20] See on this Ricardo, 1951, *Works*, Vol. III, pag. 55

The expression "The quantity of money [...] must depend on its value" fully ensures Ricardo's awareness about the relation between the quantity of commodity money and its price system in the long run: once the relative prices of commodities (among which we include gold) is known, determined according to the amount of the embodied labour required to produce them and expressed in terms of a standard such as gold, it is also known the amount of gold needed to circulate goods produced in the system, namely the 'natural' amount of money; in summary, the 'natural' quantity of commodity money, in the long run, depends on its value, i.e. by the price of gold relative to commodities.

However, according to Ricardo, the quantity of commodity money can temporarily deviate from its 'natural' level, generating a temporary variation of the relative value of gold. A mechanism exists, though, that allows the quantity of commodity money to return to its natural level, and thus to bring the relative value of gold to the level prior to the additional increase in the quantity of commodity money. It is interesting to note that, as we shall better in the next paragraph, the analysis of such a mechanism is performed by Ricardo in writings previous the *Principles*.

4. The "natural quantity" of money vs the "natural proportion" between money and prices.

4.1 In the introduction to *The High Price of Bullion* Ricardo expresses his opinions about the depreciation of notes occurred after 1797. According to the English economist, which he views as due to an overabundance of means of circulation:

> "The writer proposes, from the admitted principles of political economy, to advance reasons, which, in his opinion, prove, that the paper-currency of this country has long been, and now is, at a considerable discount, proceeding from a superabundance in its quantity, […]" (Ricardo, *Works*, 1951, Vol. III, p. 51).

In addition, Ricardo believes that the relevance of depreciation of notes should be assessed only on the basis of the difference between the sterling market price of gold and its mint price. Ricardo maintains that that difference will become 'permanent' only in the case in which banknotes are no longer convertible into gold and this principle will be incorporated in the Bullion Report of 1810: "[…] it is by a comparison of the market and mint value of bullion, that the fact of the depreciation of the currency can be estimated." (Ricardo, 1951, *Works*, Vol. III, p. 205).

Ricardo affirms that, in a convertibility regime, the sterling market price of gold can only temporarily vary above the mint price; market forces will tend in fact to ensure

the convergence of the former to the latter. Ricardo fully expressed this position in the article sent to the Morning Chronicle in 1809 and entitled *The Price Of Gold*. There, Ricardo specified that "Whilst the Bank pays its notes in specie, there can never be any great difference between the mint and market-prices of gold." (Ricardo, 1951, Works, Vol. III, p. 15), saying that in the period between 1777 and 1797 - i.e. in the twenty years preceding the entry into force of the Bank Restriction Act, the average market price of gold had never exceeded 3l. 17s. 7d - with mint price set 3l. 17s. 10 1/2 d. Following the establishiment of the Bank Restriction Act in 1797, the market price grew to 4l. 13s. ounce[21].

In a convertibility regime, the mint price by which it was possible to convert the notes in gold, fixed at the time to 3l. 17s. 10 ½ d., represents, according to Ricardo, the long-term value of the sterling price of gold. Ricardo admits, however, that there may be temporary changes in the market price of gold in comparison to the mint price. Ricardo explains this phenomenon by saying that, as a result of an additional issuing of notes[22], there is the possibility that a temporary increase in the market price of gold occurs - "If, then, whilst the Bank paid in specie gold rose to 4l . or it will more per ounce [...] "(Ricardo, 1951, *Works*, Vol. III, pp. 15-16) - which, however, would cause a run to exchange banknotes against gold at a mint price of 3l. 17s. 10 ½ d and then sell it on the market of gold at the price of 4l. or more per ounce, thus obtaining a capital gain.

Hence this would generate an excess supply of gold and the competition between operators, together with the price specie flow mechanism – caused by the diminution in the relative value of gold compared to other commodities - would potentially reduce the sterling market price of gold towards the mint price and also reduce the amount of money in circulation to the level preceding the additional issue, i.e. to its 'natural' level[23][24]:

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[21] See on this Ricardo, *Works*, 1951, Vol. III, pag. 15

[22] Morgan (1965) affirms that there were various channels through which the Bank of England was able to introduce banknotes in circulation: "There were four channels through which Bank of England notes might come into circulation: in exchange for bullion bought by the Bank, in advances to the government or to individuals, through the purchase of securities in the market, and through the discounts of commercial bills." (Morgan, 1965, pag. 4) Although Ricardo doesn't explain here by which rules the Bank of England introduces notes in circulation, since the context is clear that he is talking about additional issuing of notes, it is possible that the English economist refers to the first channel described by Morgan – i.e. the issue of banknotes against gold - because through this channel we would not appreciate a *net* entry of money, but a simple substitution between gold and paper money – i.e. a pure change in the composition of circulating medium.

[23] See on this Marcuzzo and Rosselli (2015, p. 371). The temporary decline in the relative value of gold in terms of goods - that is, the decrease in the real value of gold - described by Ricardo - rests probably on the following assumption. In conditions of convertibility, the time when a greater amount of banknotes is fed into the circulation, according to the quantitative theory an increase occurs in the market price of gold and other goods in terms of pounds. However, the market price of gold in terms of pounds would quickly tend to converge to the value set by the mint as the operation of "arbitrage" described above are bound to show their effects on the market price of gold more rapidly than the effects of gold export abroad on the amount of domestic currency and, therefore, on reducing the price of other goods in

> "these dealers would exchange their notes at the Bank, obtaining an ounce of gold for every 3l. 17s. 10 d. in bank notes. This gold would be melted and sold, or exported for 4l. or more in bank-notes per ounce; and as this operation might be repeated daily, or indeed hourly, it would be continued *till the Bank had withdrawn the superfluous quantity of their notes from circulation*, and had thereby brought the market and mint prices of gold to a level." (Ricardo, 1951, *Works*, Vol. III, p. 16; italics added)

In a convertibility regime – in which the Bank of England is 'forced' to sell gold on demand in exchange for notes – the banking system cannot increase the amount of banknotes on the basis of pure discretionary choices, otherwise a constantly flowing of gold outside national borders would come in and, therefore, a loss of the gold reserves needed to hold up the convertibility regime.

In this context, Ricardo affirms that "This is the only check which can exist to an over issue from the Bank, and was so well known that the Bank never ventured on it with impunity." (Ricardo, 1951, *Works*, Vol. III, p. 16). That is why Ricardo states that "No efforts of the Bank could keep more than a certain quantity of notes in circulation, and if that quantity was exceeded, its effects on the price of gold always brought the excess back to the Bank for specie." (Ricardo, 1951, *Works*, Vol. III, p. 16).
Therefore, in a convertibility regime, Ricardo describes a sort of automatic mechanism that is able, first, to bring the quantity of money back to its 'natural' level- through both the arbitrage between gold and banknotes and the gold exportation abroad - and, secondly, to prevent the Bank of England from raising at its own discretion the amount of banknotes in circulation, on pain of the continuous decline of the gold reserves in its possession[25].

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sterling terms. That's why, the price of gold in terms of goods will diminish until the gold is exported abroad to buy foreign goods, i.e. as long as the price of goods in terms of pounds does not return to the original level.

[24] By virtue of the mechanism described it seems the affirmation distances can take De Vivo (1987), which states: "The contradiction between a quantity theory and in labor (or at cost of production) theory of the value of money is obvious . [...] There is no explicit attempt at reconciling the two conflicting views in Ricardo. "(De Vivo, 1987, p. 195). We have in fact seen that, in the case where the system has a commodity-money, according to Ricardo the quantity theory is valid only in the moment in which the quantity of money is located above or below the "natural" level of long period, the latter being ultimately determined by the "cost of production" of the commodity money.

[25] Although the reasoning involves the presence of the convertibility of banknotes into gold – i.e. the presence of a substantial equality between banknotes and gold - the reader may wonder about the return process of the quantity of banknotes to their 'natural' level. We have seen in fact that, following the increase of the market price of gold in terms of pounds, there is a run-up by the operators to buy gold in exchange of banknotes by the Mint, which implies a reduction of the quantity of circulating banknotes accompanied however by a simultaneous increase in circulating gold. Following the reduction in the relative value of gold in terms of goods, the gold will be exported outside the national borders.
Now a question can be asked: if, under conditions of convertibility, banknotes and gold are the same thing, why the amount of banknotes has returned to the level before the additional input, while the

4.2 After the suspension of the convertibility regime in 1797, according to Ricardo "all checks to the over issue of notes were removed, excepting that which the Bank voluntarily placed on itself" (Ricardo, 1951, *Works*, Vol. III, p. 17), which involved an increase in the sterling market price of gold, maintaining itself for long time above the mint price[26].

Ricardo thought that the sterling depreciation was a question of overabundance of banknotes in circulation, caused exactly by non-binding provisions on the golden reserves which up to 1797 the Bank of England had to comply. The depreciation – considering alternatively the continuous increase of money prices of goods in England[27] - was a serious concern for Ricardo, particularly for the negative effects of such price increase on wealth:

> "It would then be evident that all the evils in our currency were owing to the over-issues of the Bank, to the dangerous power with which it was entrusted of diminishing at its will, *the value of every monied man's property*, and by enhancing the price of provisions, and every necessary of life, injuring the public annuitant, and all those persons whose incomes were fixed, and who were consequently not enabled to shift any part of the burden from their own shoulders." (Ricardo, 1951, *Works*, Vol. III, pag. 21, italics added)[28]

According to Ricardo, in an inconvertibility regime, the money price increase caused by an additional issue of banknotes has to be regarded no longer as a temporary or short-run phenomenon. The reason lies in the fact that the banking system is no more forced to provide gold on demand in exchange for banknotes; hence the system will not be affected by a diminution of the value of gold relative to other commodities.

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amount of gold has actually decreased after flowing out of the country and does not return to the level before the additional input of bank notes? Actually, the matter is soon resolved. In fact, under conditions of convertibility, notes and gold are the same thing, the reduction of bank notes in circulation, i.e. its return into the Mint coffers, following the rise in market price of gold in pounds, was accompanied by a simultaneous input of gold in circulation. From the point of view of the amount of money in circulation nothing has changed and, just simply, banknotes have been replaced by gold. The reduction of banknotes and the simultaneous input of gold leave unchanged the net increase of money in circulation caused by the additional input of banknotes, which in fact persists until gold is exported. It is actually the outflow of gold from the national borders which allows the amount of money to bet back to the "natural" level. Nevertheless, the overall system has suffered a loss of gold reserves.

[26] Cf. Ricardo, 1951, Works, Vol. III, pag. 15

[27] "Parliament, by restricting the Bank from paying in specie, have enabled the conductors of that concern to increase or decrease at pleasure the quantity and amount of their notes; and the previously existing checks against an over-issue having been thereby removed, those conductors have acquired the power of increasing or decreasing the value of the paper currency." (Ricardo, 1951, *Works*, Vol. III, pag. 75)

[28] A few lines ahead, at the start of the letter *First Reply to a 'Friend to Bank-Notes'* published in the Morning Chronicle on 20 September 1809, Ricardo likewise assumes that "[…], I expressed my apprehensions of the serious consequences which might attend the increasing depreciation of paper. *By lessening the value of the property of so many persons*, and that in any degree they pleased, it appeared to me that the Bank might involve many thousands in ruin." (Ricardo, 1951, *Works*, Vol. III, page 21; italics added). Cf. also Ricardo (*Works*, 1951, Vol. IV, pag. 52; Vol. III pp. 74-5)

When convertibility is suspended banknotes cannot be exchanged anytime for gold at the mint, but only on the market (Boffito, 1979, p. 22). Therefore, against an increase in the quantity of banknotes in circulation, both the price of gold and the price of other goods in terms of sterlings will increase, but there will no longer be the mechanism by which the market price of gold quickly reverts to the mint price. In other words, there will not be a reduction in the relative value of gold since for both gold and other commodities there will be a permanent increase in price in terms of currency:

> "It has been observed, in a work of great and deserved repute, the Edinburgh Review, that an increase in the paper currency will only occasion a rise in the *paper* or *currency* price of commodities, but will not cause an increase in their bullion price. This would be true at a time when the currency consisted wholly of paper not convertible into specie, but not while specie formed any part of the circulation." (Ricardo, 1951, Works, Vol. III, pag. 64)

In this regard, Ricardo stresses that, in a situation in which banknotes are no longer convertible into gold:

> "When the circulation consists wholly of paper, any increase in its quantity will raise the *money* price of bullion without lowering its *value,* in the same manner, and in the same proportion, as it will raise the prices of other commodities, and for the same reason will lower the foreign exchanges; but this will only be a *nominal,* not a *real* fall, and will not occasion the exportation of bullion, because the real value of bullion will not be diminished, as there will be no increase to the quantity in the market." (Ricardo, 1951, *Works*, Vol. III, pag. 64)

The suspension of convertibility is equivalent to argue that in the economic system there is no longer a commodity money but rather a *fiat* money; the economy in question is located in other words in a situation in which "bank-notes are the standard measure of value" (Ricardo, 1951, *Works*, Vol. III, pag. 79), and where "gold coin is only a commodity" (Ricardo, 1951, *Works*, Vol. III, pag. 79).

Furthermore, the moment in which the Bank of England is not obliged to sell gold on request, it is no longer possible to speak of a 'natural' quantity of money. Since notes issued do not coincide with gold, the amount of money that allows goods to circulate in the long run at their 'normal' price is no longer determined on the basis of the technical conditions of production of the commodity money. Consequently, it is not possible to identify a single quantity of money compatible with the circulating goods, but several amounts of *fiat* money anyway would be anyway be compatible with different "absolute" price levels. In other words, it is possible to refer to a 'natural' proportion between quantity of *fiat* money and price level rather than to a 'natural' quantity of money (Ricardo, 1951, *Works*, Vol. III, pp. 90-1).

Ricardo put forward the concept of 'natural proportion' in *The High Price Of Bullion* without - and this clarification is due - relegating it to the case of a *fiat* money, that is to say an inconvertibility regime. More generally, with regard to this proportion Ricardo expresses himself in this way:

> "The value of the circulating medium of every country bears some *proportion* to the value of the commodities which it circulates. In some countries this proportion is much greater than in others, and varies, on some occasions, in the same country. It depends upon the rapidity of circulation, upon the degree of confidence and credit existing between traders, and above all, on the judicious operations of banking." (Ricardo, 1951, *Works*, Vol. III, p. 90, corsivo nostro)

Immediately after the above passage, however, Ricardo points out that "No increase or decrease of its quantity, whether consisting of gold, silver, or paper-money, can increase or decrease its value above or below this proportion." (Ricardo, 1951, *Works*, Vol. III, p. 90). Regardless of whether money is a commodity or not, it seems possible to identify a unique value of the relationship between money supply and price level, say a 'natural' proportion. For the case of a commodity money Ricardo maintains that:

> "If the mines cease to supply the annual consumption of the precious metals, money will become more valuable, and a smaller quantity will be employed as a circulating medium. The diminution in the quantity will be proportioned to the increase of its value. In like manner, if new mines be discovered, the value of the precious metals will be reduced, and an increased quantity used in the circulation; so that *in either case the relative value of money, to the commodities which it circulates, will continue as before*." (Ricardo, 1951, *Works*, Vol. III, p. 90, italics added)

In a convertibility regime the 'natural' proportion between the quantity of money and the price level is based on the natural quantity of money, the latter being determined by the relative price system; we can call this 'natural proportion' the 'natural' *real* quantity of money, which corresponds, in the case of a commodity money, to a single amount of money.

An exogenous temporary increase of the amount of money above the "natural" level would be eliminated thanks to the arbitrage and the exportation of gold we talked before:

> "!If, whilst the Bank paid their notes on demand in specie, they were to increase their quantity, they would produce little permanent effect on the value of the currency, because nearly an equal quantity of the coin would be withdrawn from circulation and exported." (Ricardo, 1951, Works, Vol. III, p. 90)

Conversely, when gold convertibility is suspended and *fiat* money circulates, there are several quantities of money compatible with that 'natural' proportion between money and the price level:

> "If the Bank were restricted from paying their notes in specie, […], any excess of their notes would depreciate the value of the circulating medium in proportion to the excess. If twenty millions had been the circulation of England before the restriction, and four millions were added to it, the twenty-four millions would be of no more value than the twenty were before, provided commodities had remained the same, and there had been no corresponding exportation of coins; and if the Bank were successively to increase it to fifty, or a hundred millions, the increased quantity would be all absorbed in the circulation of England, but would be, in all cases, depreciated to the value of the twenty millions." (Ricardo, 1951, *Works*, Vol. III, p. 91)

Therefore, we can summarize Ricardo's conception about the difference between commodity money and *fiat* money. When we are in a convertibility regime and, consequently, a commodity money circulates:

a) The "natural" quantity of money, according to Ricardo, is determined on the basis of real needs of the economic system – i.e., the technical conditions of production - and / or scarcity; such determination is independent from the adopted theory of value, because as we have seen the concept of the 'natural' quantity of money is compatible with the first, and rather general, formulations of Ricardo about the exchange value of commodities, when a definite theory of value was not yet fully designed.

b) The "natural" proportion between quantity of commodity money and price level is determined by of a given amount of commodity money required to circulate goods at their respective long-term or normal relative prices; there is therefore a unique 'natural' quantity of commodity money compatible with that proportion, the former being ultimately determined by the technical conditions of production (including those of the commodity chosen as money) and, therefore, by the relative price system.

In the case in which a *fiat* money circulates instead:

a) It is no longer possible to speak of a 'natural' quantity of money, as money is not a commodity and therefore we cannot identify a single nominal amount of money that circulates goods at their "normal" prices, but several amount of *fiat* money;

b) The 'natural' proportion between the quantity of fiat money and the price level is ultimately determined not by the relative price system, but by the ratio between the volume of transactions and the velocity of money circulation. Starting from the well known equation of exchange $MV = PT$, where M is the quantity of *fiat* money, V the velocity of circulation, P the monetary price level and T the volume of transactions, suitably reordering we'll obtain $\frac{M}{P} = \frac{T}{V}$. Knowing, therefore, the velocity of circulation and the volume of transactions, we also know the ratio between the nominal quantity of money and the price level. In Ricardo's analysis, in fact, the velocity of circulation and the volume of transactions are determined independently of the quantity of money and the level of prices.

Shortly, when a fiat money circulates, the 'natural' proportion between the quantity of money and the price level is compatible with several quantities of fiat-money and price levels[29]. Conversely, if a commodity money circulates, the 'natural' proportion between the quantity of money and the price level is still determined by the ratio between the volume of transactions and the velocity of circulation, but in this case there is a unique quantity of commodity money consistent with that relationship, i.e. that amount of money ultimately determined by the relative price system and necessary to circulate goods at their normal prices.

Finally it may be useful summarize the difference between an increase in the amount of commodity money compared to an increase of the quantity of *fiat* money with the following passage:

> "In the case of the mine, as the currency of all countries would be equally depreciated its effects would be visible only in the rise of prices of all commodities for which money is exchanged, and the exchange which expresses the relative value of the currencies of different countries would continue at par;—but in the case of the augmentation of Bank notes not convertible into specie at the will of the holder, the rise of the prices of commodities is confined to the country where the notes are issued and consequently the depreciation of money is local and not general; and is made evident by the effect produced on the exchange with foreign countries, which deviates from par nearly in the same proportion as the money is depreciated." (Ricardo, 1951, *Works*, Vol. III, p. 377)[30]

[29] "Expansion of inconvertible paper, […], could be continued indefinitely, as we now find, creating a cycle of overissue, depreciation and price inflation – without any self-correcting mechanism."(Green, 1992, p. 149) See on this also Smith (2013): "It is under an inconvertible monetary system, which was the case in Britain during the Restriction Period (1797-1821), that Ricardo's quantity theory of money applies to both the short- and the long-run." (Smith, 2013, p. 183)

[30] "The circulation can never be over-full. If it be one of gold and silver, any increase in its quantity will be spread over the world. If it be one of paper, it will diffuse itself only in the country where it is issued. Its effects on prices will then be only local and nominal, as a compensation by means of the exchange will be made to foreign purchasers." (Ricardo, 1951, *Works*, Vol. III, pp. 91-2)

In the case of an increase of the commodity money, thanks to the conversion mechanism at the mint as well as to gold export abroad, in the long run the value of gold relative to other commodities will be the same in all countries, as the exchange rate will remain stable at the 'natural' level[31].

Conversely, in the case of an increase in the fiat money, the increase in sterling prices will be confined to the country in which the issuing of additional currency is effected and the increase in the price level, as well as the change in the exchange rate will be permanent.

5. The natural rate of interest and the convergence process of the market rate to the natural rate in Ricardo's analysis.

5.1 For the purposes of the analysis of the convergence of the market interest rate towards the natural level, as well as with regard to the study of the links between that process and the conception of money in Ricardo, it should first be pointed out the way in which Ricardo defines natural and market interest rates, and the relationship between the interest rate and the rate of profit. With regard to the latter point, in the elaboration of Ricardo as well as in that of the classical economists from Smith to Marx, the interest rate of the study is in fact closely connected to the theory of distribution.

As specified by Pivetti (1987), in the theories of distribution of Smith, Ricardo and Marx the normal profit is made up of two parts: the rate of money-interest and corporate profit. These two quantities, within the classical analysis of distribution, cannot be determined separately from each other. Given the normal rate of profit determined by the real wage and (direct and indirect) conditions of production of wage goods, the interest rate or enterprise profits should be residually determined. However, there are important differences between Smith and Ricardo, on one hand, and Marx, on the other, about the relation between rate of profit, rate of interest and enterprise profit[32].

Ricardo Smith takes the view that the interest rate is "ultimately and permanently Governed by the rate of profit" (Ricardo, 1951, Works, Vol. I, p. 297)[33], arguing that

[31] See Ricardo, 1810-11, *The High Price of Bullion*, p. 64, already quoted

[32] Marx's analysis of the interest rate and the relations between the rate of profit, interest rate and the profit of enterprise, with a particular focus on how to conceive the business profits both in Ricardo and Marx, is the subject of another paper titled "The determinants of the rate of interest and the relation with the rate of profit in Marx's analysis".

[33] Cf. Ricardo, 1951, Works, Vol. III, pp. 25-6, pag. 151

since "is extremely difficult to determinates the rate of the profits of stock [...], the [...] rate of interest will lead us to form some notion of the rate of profits, and the history of the progress of interest afford us that of the progress of profits. "(Ricardo, 1951 Works, Vol. I, p. 296). This can be stated by Ricardo in that he believes that "it is evident That much will be given for the use of money, When much can be made by it" (*ibidem*), establishing that the return of money employed in production (the rate of profit) must be equal to the return from lending that same money (the interest rate), with the addition of a remuneration for the "risk and trouble "(the enterprise profits) to employ productively the capital borrowed . According to Ricardo there is a minimum level below which the enterprise profit cannot go without undermining the accumulation incentive:

> "The farmer and manufacturer can no more live without profit, than the labourer without wages. Their motive for accumulation will diminish with every diminution of profit, and will cease altogether when their profits are so low as not to afford them an adequate compensation for their trouble, and the risk which they must necessarily encounter in employing their capital productively." (Ricardo, 1951, Works, Vol. I, p. 122)

This way of conceiving the relationship between rate of profit, interest rate and enterprise profit suggests to Ricardo, in the wake of Smith, that since the interest rate is determined, ultimately, by the rate of profit , it is the interest rate representing, in that system of relations, the residual magnitude, while the enterprise profit is not subject to particular changes at least in the long run; in other words, the enterprise profit is regarded by Ricardo as a "normal" magnitude (Pivetti, 1987, p. 64).

According to this view the interest rate, as determined by the rate of profit, is the "natural" (or long-term) rate of interest, as opposed to the market (or short-term) interest rate which, according to Ricardo, is determined, similarly to the market price of any other commodity, by the relationship between supply and demand:

> "[53] Do you think there is anything in the nature of money, or of the transactions regarding the borrowing or lending of money, which distinguishes it from other commodities which find their value in the market, according to the proportion of demand and supply?
> None, whatever; the market rate of interest for money depends on the proportion between the borrower and the lender of capital, without reference to the quantity or value of the currency by which the transactions of the country are carried on." (Ricardo, 1951, *Works*, Vol. V, pag. 346)

> "[52] What are the grounds of your opinion of the principle by which the rate of interest is regulated?
> It is regulated by the demand and supply, in the same way as any other commodity; but the demand and supply itself is again regulated by the rate of profit to be made on capital." (Ricardo, 1951, *Works*, Vol. V, pag. 346)

We can thus see that in Ricardo's view the rate of profit determines the natural rate of interest while the ratio between demand and supply of money determines the market rate of interest, that is to say the fluctuations of the latter around its normal or long-term level[34] and, hence, the fluctuations of enterprise profit to its natural level.

The presence of both a "natural" rate of interest and a market rate necessarily implies the existence of a gravitation mechanism of the latter to the former; the fluctuations of the market rate above or below the natural level are then treated as merely temporary.[35]

5.2 As mentioned above, according to Ricardo fluctuations in the market interest rate are determined by changes in supply of or demand for money. It must be specified that when analyzing the convergence of the market interest rate to its natural level, for reasons that will be clear in the conclusions of the present paper, Ricardo appears to have in mind a *fiat* money system.
With regard to exogenous changes in money supply, Ricardo expresses his ideas in *The High Price Of Bullion*:

> "I do not dispute, that if the Bank were to bring a large additional sum of notes into the market, and offer them on loan, but that they would for a time affect the rate of interest. The same effects would follow from the discovery of a hidden treasure of gold or silver coin. If the amount were large, the Bank, or the owner of the treasure, might not be able to lend the notes or the money at four, nor perhaps, above three per cent.; but having done so, neither the notes, nor the money, would be retained unemployed by the borrowers; they would be sent into every market, and would everywhere raise the prices of commodities, till they were absorbed in the general circulation. It is only during the interval of the issues of the Bank, and their effect on prices, that we should be sensible of an abundance of money; interest would, during that interval, be under its natural level; but as soon as the additional sum of notes or of money became absorbed in the general circulation, the rate of interest would be as high, and new loans would be demanded with as much eagerness as before the additional issues." (Ricardo, 1951, Works, Vol. III, p. 91)

[34] On this Panico (1983) states, talking about Ricardo, that: "The movements of the interest rate quoted every day in the money market instead, did not reflect changes of the rate of profits in the same direction. They reflected the scarcity or abundance of money in the market."(Panico, 1983, p. 15)
[35] As we will see below Ricardo seems to be quite clear and explicit on this point, although in a letter to Malthus of 1817 he claims: "Although interest is undoubtedly ultimately regulated by profits, rising when they are high, and falling when they are low, yet there are considerable intervals during which *a low rate of interest is compatible with a high rate of profit*, and this generally occurs when capital is moving from the employments of war to those of peace." (Ricardo, 1951, *Works*, Vol. VII, p. 199)

The argument is also addressed in *Principles*, where Ricardo says:

> "The rate of interest, though ultimately and permanently governed by the rate of profit, is however subject to temporary variations from other causes. […]. If by the discovery of a new mine, by the abuses of banking, or by any other cause, the quantity of money be greatly increased, its ultimate effect is to raise the prices of commodities in proportion to the increased quantity of money; but there is probably always an interval, during which some effect is produced on the rate of interest." (Ricardo, 1951, Works, Vol. I, pp. 297-8)

On the basis of what is claimed by Ricardo, the change in the interest rate following an exogenous change in the money supply is the same regardless of the type of money which circulates in the economic system. In other words, whether the system circles a commodity money or coin-sign, the increase in supply of nominal money supply results in a reduction in the interest below the natural rate level - thus also an increase in supply Real money than the natural relationship. According to Ricardo it is the increase in the price level which brings the interest rate and the real quantity of money back to their normal levels[36][37].

With regard to exogenous changes in the demand for money, Ricardo mentions the subject in the *Principles*:

> "When the market prices of goods fall from an abundant supply, from a diminished demand, or from a rise in the value of money, a manufacturer naturally accumulates an unusual quantity of finished goods, being unwilling to sell them at very depressed prices. To meet his ordinary payments, for which he used to depend on the sale of his goods, *he now endeavours to borrow on credit, and is often obliged to give an increased rate of interest.* This, however, is but of temporary duration; for either the manufacturer's expectations were well grounded, and the market price of his commodities rises, or he discovers that there is a permanently diminished demand, and he no longer resists the course of affairs: prices fall, and money and interest regain their real value." (Ricardo, 1951, Works, Vol. I, pp. 297-8, italics added)

In this case, following a temporary fall in the level of prices producers will increase their demand for money resulting from a decreased flow of cash revenues compared with contract payments (e.g. money wages), which will generate an increase in the interest rate. If the reduction of prices is temporary, the restoration of the normal flow of revenues following the increase in prices, will allow producers to meet contract payments; the reason for the increase in money demand ceases and, therefore, the interest rate returns to its natural level. If, conversely, the reduction in

[36] Ricardo also affirms that: "Reduction or Increase of the Quantity of Money always ultimately raises or lowers the Price of Commodities; when this is effected, the Rate of Interest will be precisely the same as before; *it is only during the Interval, that is, before the Prices are settled at the new Rate, that the Rate of Interest is either raised or lowered*." (Ricardo, 1951, Works, Vol. V, pag. 445, corsivo nostro)

[37] See on this Caminati (1981) and Petri (1983, p. 17)

prices is permanent, a general reduction in the monetary value of transactions will be observed - therefore also a reduction in money wages - which will generate a permanent reduction in the demand for money and the return of the interest rate to the natural level. Even in this case, as in the case of a change in the money supply, it is ultimately the price level the relevant variable able to bring the interest rate back to the natural level.

6. Some perplexities about the convergence process of the market rate of interest to the natural rate.

6.1 We believe, in light of what we said above, that the process of convergence of market interest rate to its natural level resulting from an exogenous change in the money supply can be challenged on the basis of the same allegations by Ricardo. The increase in the level of prices subsequent to the issuing of money need not be capable to push the market interest rate up to the natural rate, despite the real quantity of money would revert to its "natural" level. Ricardo himself, in fact, states that "It is only during the interval of the issues of the Bank, and their effect on prices, that we should be sensible of an *abundance of money*" (Ricardo, 1951, *Works*, Vol. III, pag. 91, italics added).

The increase in prices might just increase the demand for money to the extent needed to meet the increased supply, which would otherwise be exceeding, and a new "equilibrium" would be then established between demand for and supply of money at the lower-than-natural interest rate initially occasioned by bank behaviour . It cannot be agreed, in our opinion, Ricardo's statement that "as soon as the additional sum of notes or of money became absorbed into the general circulation, *the rate of interest would be as high* [...]" (Ricardo, 1951 Works, Vol. I, pp. 297-8, emphasis added). To allow for the interest rate to return to its natural level the convergence would require an increase in the demand for money beyond that needed to meet the increased supply, therefore greater than the one generated by the increase in the price level which reestablishes the natural money-price ratio.

In order to strength our argument, it is appropriate, however, to develop more clearly the concept of demand for money to which Ricardo seems to have in mind. This analysis will be useful to compare Ricardo's conception with the other one of *'applications to the bank for money*' himself introduces in the Principles. The following paragraph precisely puts forward the latter concept (note that in this context Ricardo

refers to the market rate of interest meaning the natural as opposed to the bank rate)[38]:

> " The *applications to the Bank for money*, then, depend on the comparison between the rate of profits that may be made by the employment of it, and the rate at which they are willing to lend it. If they charge less than the market rate of interest, there is no amount of money which they might not lend,—if they charge more than that rate, none but spendthrifts and prodigals would be found to borrow of them." (Ricardo, 1951, Works, Vol. I, p. 364, italics added) [39]

Hence, according to Ricardo the "applications to the bank for money" depend on the difference between the interest rate and the rate of profit obtained from the productive use of money.

A reduction in the interest rate below the natural level generates, given the rate of profit, an increase of enterprise profit above the 'normal' level. This increase induces

[38] See on this Panico (1983) and Diatkine (2014)

[39] The passage mentioned in the text is worth reading along with the following one: "To suppose that any increased issues of the Bank have the effect of *permanently lowering the rate of interest*, and satisfying the demands of all borrowers, so that there will be none to apply for new loans, or that the productive gold or silver mine can have such an effect, is to attribute a power to the circulating medium which it can never possess. Banks would, if this were possible, become powerful engines indeed. *By creating paper money, and lending it at three or two percent under the present market rate of interest*, the Bank would reduce the profits on trade in the same proportion; and if they were sufficiently patriotic to lend their notes at an interest no higher than necessary to pay the expenses of their establishment, profits would be still further reduced; no nation but by similar means, could enter into competition with us, we should engross the trade of the world. To what absurdities would not such a theory lead us! Profits can only be lowered by a competition of capitals not consisting of circulating medium." (Ricardo, 1951, *Works*, Vol. III, p. 92, italics added). Here Ricardo believes that, not only the banking system has no power to permanently reduce the rate of interest below the natural level determined by the rate of profit, but also that, starting from 1797, the year of entry into force of the Bank Restriction Act, the Bank of England had begun to make loans at a below-market interest rate:"The reason, then, why for the last twenty years, the Bank is said to have given so much aid to commerce, by assisting the merchants with money, is, because they have, during that whole period, lent money *below the market rate of interest; below that rate at which the merchants could have borrowed elsewhere*; but, I confess, that to me this seems rather an objection to their establishment, than an argument in favour of it." (Ricardo, 1951, *Works*, Vol. I, p. 364, italics added). As highlighted by Diatkine in this regard (2011, pp. 10-1, italics added): "In maintaining bank rates below the market rate, banks can lend an *infinite quantity of money*" and, a few lines below, "By fixing the rate of interest below the market rate, banks will disturb competition in the market." The practice by the Bank of England to make loans at a below-market interest rate was viewed with suspicion by Ricardo, who considered that the continued placing of non-convertible notes in circulation would lead to a depreciation of the money: "Whether a bank lent one million, ten million, or a hundred million, they would not permanently alter the market rate of interest; they would alter only the value of the money which they issued." (Ricardo, 1951, *Works*, Vol. I, pp. 363-4) and to un unjustified profit increase for the bank itself (Diatkine, 2011, p. 8). The same author also claims that: "Therefore, in Ricardo, there is only a market rate of interest that cannot permanently deviate from its natural level or from the rate of profit.[…]. The market rate of interest is determined as any commodity price is determined." (Diatkine, 2011, p. 11) and that, therefore, in Ricardo "[…]a bank credit rate is not different from such a market rate. We may ignore banks." (Diatkine, 2011, p. 11) The activities of the Bank of England, since the entry into effect of the Bank Restriction Act, motivated Ricardo to prepare the "*Plan For National Bank*", according to which "The only role of the public bank he wanted to establish was that of issuing money, but not lending it. If this Bank replaced the Bank of England, this would not preclude merchants from borrowing money from elsewhere." (Diatkine, 2011, p. 8) See on this Ricardo (1951, Works, Vol. I, p. 365)

an additional request for loans caused by the increased profitability of employing money productively[40].

6.2 In outlining the determinants of the demand for money, Ricardo seems to refer exclusively to the value of transactions. Both in *Reply to Mr. Bosanquet Practical Observations* and in the *Principles*, in fact, Ricardo provides a definition of the demand for money:

> "The plea that no more is issued than the wants of commerce require is of no weight; because the sum required for such purpose cannot be defined. Commerce is insatiable in its demands, and the same portion of it may employ 10 millions or 100 millions of circulating medium; the quantity depends wholly on its value". (Ricardo, 1951, *Works*, Vol. III, page 215)

> "the demand for money is not for a definite quantity, as is the demand for clothes, or for food. The demand for money is regulated entirely by its value, and its value by its quantity." (Ricardo, 1951, *Works*, Vol. I, page 193)

From the quotations above, the idea emerges of a demand for money strictly dependent on the relative value of money in terms of other goods, expressed by the ratio $\frac{1}{P}$, given the proportion between the volume of transactions and the velocity of circulation $(\frac{T}{V})$. In the case of a commodity money, the relative value of money depends, ultimately, on the technical conditions of production of the same commodity money, while in the case of a *fiat* money, it depends, according to Ricardo, on the quantity of money put in circulation. In both cases, however, a reduction or an increase in the relative value of money represents, respectively, a greater or lesser requirement for monetary transactions, therefore, a greater or lesser demand for money.

How to interpret, then, the "applications to the Bank for money" mentioned by Ricardo, ultimately depending on the difference between the interest rate and the profit rate, i.e. from a greater than normal enterprise profit? They could be defined

[40] It should be clarified that such explanation regarding what, conceivably, Ricardo considers to be the determinant of the applications to the bank for money, is of a general character, in the sense that there seems no reason to connect its validity to conditions of convertibility or of inconvertibility. However, the passage just quoted seems to make explicit reference to a situation of money inconvertibility in which the banking system is altering the "normal" functioning of the credit market, as it claims that if the monetary interest rate falls below the natural level there is no limit to the quantity of money that the banking sector (in this case the Bank of England) is able to place. Such an event would only be compatible with non-convertible notes because, as we have already had occasion to emphasize, when convertibility was suspended in England by the Bank Restriction Act, the banking system found no limits in issuing money in the absence of a gold reserve "constraint".

as a money demand by producers who, motivated by the possibility of obtaining higher enterprise profits (given an interest rate lower than the natural level), ask, with that same money, for labor and capital goods in an effort to expand the production volume. This attempt, however, collides with an unchanged level of activity, since the latter in Ricardo, and more generally in the classical economists, is to be determined according to the stage reached by capital accumulation[41].
This increase in the demand for labor and means of production generates an increase in the level of money prices of all goods, which enables the system as a whole to absorb the increased amount of money being borrowed by the producers and put into circulation. In other words, if, hypothetically, the price level were not increasing, the greater quantity of money in the system would, sooner or later, be returned to the banking system since for the aggregate economy it would be redundant relatively to an unchanged value of transactions.

We can then see that the additional amount of money is borrowed in order to increase business of those who applied for it[42]. However, such producers 'hopes' are only illusory, since Ricardo believes it is not possible that, in the aggregate, there can be any increase in the production volume in response to an increased amount of money in circulation[43]. It could happen, however, that some manufacturers manage

[41] One of the many passages on the subject, as in Chapter XXXI "On Machinery" of the *Principles*, sums up fairly well the opinion of:"But with every increase of capital he would employ more labourers; and, therefore, a portion of the people thrown out of work in the first instance, would be subsequently employed; and if the increased production, in consequence of the employment of the machine, was so great as to afford, in the shape of net produce, as great a quantity of food and necessaries as existed before in the form of gross produce, there would be the same ability to employ the whole population, and, therefore, there would not necessarily be any redundancy of people." (Ricardo, 1951, *Works*, Vol. I, p. 390). See on this also Garegnani (1978, p. 341)

[42] "The interest which a man agrees to pay for the use of a sum of money is in reality a portion of the profits which he expects to derive from the employment of a capital which that sum of money will enable him to obtain. In the interest which he is willing to pay he is guided solely by the probable extent of those profits." (Ricardo, 1951, *Works,* Vol. III, page 374)

[43] Ricardo does not deny, in principle, that an increase in the quantity of money in circulation may have an impact on production levels (Marcuzzo and Rosselli, 1994, p. 1256). In this regard he states that: "There appears to me only one way in which any addition would be made to the Capital of a country in consequence of an addition of money. […]The manufacturer would be enabled to employ more labourers as he would receive an additional price for his commodities; he might therefore add to his real capital till the rise in the wages of labour placed him in his proper sphere. In this interval some trifling addition would have been made to the Capital of the community"(Ricardo, 1951, *Works*, Vol. VI, pp. 16-7). Any refusal to immediately adjust money wages to higher price levels can cause, according to Ricardo, an employment increase - the real capital value, in relation to money wages, would in fact be higher. However, according to Ricardo, this effect would only be temporary and would be "eliminated" as soon as the real wage returns to its natural or normal level. Ricardo also believes that the possible positive effect on activity levels resulting from additional issuing of money in circulation would be offset by reduced savings from fixed income holders. In this regard he states that: "The increase of money in my opinion can have no other effect than raising the prices of commodities. By such means some members of the community are enriched at the expence of others; there is a mere transfer of property, but no creation. Whether those who are enriched will employ their additional income more economically or more advantageously than those who before possessed it, must be matter of speculation only. My opinion however is that by no class are greater savings made than by those who are in possession of fixed monied rents and annuities. As far as they have come under my observation, and I have seen a good deal of

to steal 'market shares', expanding their production at the expense of some competitor. In this regard Ricardo says:

> "When any one borrows money for the purpose of entering into trade, he borrows it as a medium by which he can possess himself of "materials, provisions, &c." to carry on that trade; and it can be of little consequence to him, provided he obtain the quantity of materials, &c. necessary, whether he be obliged to borrow a thousand, or ten thousand pieces of money. If he borrow ten thousand, the produce of his manufacture will be ten times the nominal value of what it would have been, had one thousand been sufficient for the same purpose. The capital actually employed in the country is necessarily limited to the amount of the "materials, provisions, &c." and might be made equally productive, though not with equal facility, if trade were carried on wholly by barter. The successive possessors of the circulating medium have the command over this capital: but however abundant may be the quantity of money or of bank-notes; though it may increase the nominal prices of commodities; though it may distribute the productive capital in different proportions; though the Bank, by increasing the quantity of their1 notes, *may enable A to carry on part of the business formerly engrossed by B and C, nothing will be added to the real revenue and wealth of the country. B and C may be injured, and A and the Bank may be gainers, but they will gain exactly what B and C lose.* There will be a violent and an unjust transfer of property, but no benefit whatever will be gained by the community." (Ricardo, 1951, Works, Vol. III, page 93, italics added)

The passage just quoted refers, in general, to the impossibility of an increase in the aggregate volume of production in response to an additional issue of money. Ricardo, however, seems quite clear in maintaining that those who borrow money intend to "entering into trade" and, therefore, to dispose of the "capital" in order to start production. In this passage, however, the economy disposes of an amount of 'capital' limited by the stage reached by accumulation; therefore, although a generic producer A may be able to expand its production activities thanks to the higher amount of money, this could only happen at the expense of a generic producer B, without any possibility that the aggregate production volume increases.

It follows that if these are, in general, the effects of an increased amount of money in circulation, it is only the increase in prices which is able to absorb the highest amount of money: since, in this context, the volume of transactions may not increase, the price increase allows the monetary value of the product to grow to the extent sufficient to absorb the higher money stock.

monied men, they are amongst the most accumulating of the community." (Ricardo, 1951, *Works*, Vol. VI, page 16; De Vivo, 1987, p. 7.). Moreover, it should be noted that the temporary effects on outputs of an increase in the quantity of money in circulation will depend, according to Ricardo, on the retarded adjustment of money wages to the price level, then when the increased amount of money has already produced its own effects on prices. Our reasoning refers, on the contrary, to the 'period' when money is borrowed and has not yet been able to generate an increase in the monetary value of transactions.

According to Ricardo, then, "money cannot call forth goods" (Ricardo, 1951, *Works,* Vol. III, p. 301), so money and capital are not equivalent concepts and not dependent, in general and in a systematic way, one from the other:

> "Credit, I think, is the Means, which is alternately transferred from one to another, to make use of Capital actually existing; it does not create Capital; it determines only by whom that Capital should be employed: the removing Capital from one Employment to another may often be very advantageous, and it may also be very injurious." (Ricardo, 1951, *Works*, Vol. V, pp. 436-7)

6.3 Based on the above, therefore, Ricardo seems then to consider the demand for money as depending solely on the value of transactions, and no functional relation linking the demand for money to the interest rate can be found in his writings (Green, 1992, pp. 165-6; Takenaga, 2011; King, 2013, p. 124). This prevents Ricardo from thinking that a reduction in the interest rate may entail an increase in the quantity of money to be held as such, i.e. as an asset or as a store of value. Such a conclusion is also consistent with Ricardo's idea that in the aggregate there cannot be overproduction of commodities, hence no possibility of accumulation of money (hoarding) following a disruption of the normal monetary circuit of cash receipts and payments (Green, 1992, p. 87)

From our present-day perspective assuming a functional relation between the rate of interest and the demand for money is tantamount to say that money might be held for speculative purposes (Keynes, 1936, pp. 85-6) or that a reduction in the interest rate leads to an increase in the demand for money as an asset, on account of a reduction in the yields of alternative form of wealth, such as bonds (Friedman, 1968). Similar conceptions appear to be completely absent in Ricardo who emphasizes the peculiar nature of the demand for money as distinct from that for other commodities:

> "A country might have a monopoly of silk, or of wine, and yet the prices of silks and wine might fall, because from caprice or fashion, or taste, cloth and brandy might be preferred, and substituted; the same effect might in a degree take place with gold, as far as its use is con- fined to manufactures: but while money is the general medium of exchange, the demand for it is never a matter of *choice*, but always of necessity." (Ricardo, 1951, *Works,* Vol. I, p. 193, italics added)

In order to make the convergence process of the market rate of interest logically consistent, Ricardo would then need something like a functional relation between the rate of interest and the demand for money: the only way, in effect, by which the decrease in the interest rate would allow the economy as a whole to hold a greater

quantity of money. The presence of such functional relation would be in many respects in radical conflict with Ricardo's views as have been considered so far. This can be verified by taking into consideration the implications which are associated with that functional relation for instance in an author such as Milton Friedman who, by the way, was a strong supporter of the quantity theory of money and who precisely relies on that relation in order to explain the convergence of the market rate of interest to its natural level. The way in which Friedman clarifies the process of convergence enlightens how the theoretical context in which the relation at issue is inserted diverges from that of Ricardo:

> "How can people be induced to hold a larger quantity of money? Only by bidding down interest rates. Both are right, up to a point. The initial impact of increasing the quantity of money at a faster rate than it has been increasing is to make interest rates lower for a time than they would otherwise have been. But this is only the beginning of the process not the end. The more rapid rate of monetary growth will stimulate spending, both through the impact on investment of lower market interest rates and through the impact on other spending and thereby relative prices of higher cash balances than are desired. But one man's spending is another man's income. Rising income will raise the liquidity preference schedule and the demand for loans; it may also raise prices, which would reduce the real quantity of money. These three effects will reverse the initial downward pressure on interest rates fairly promptly, say, in something less than a year. Together they will tend, after a somewhat longer interval, say, a year or two, to return interest rates to the level they would otherwise have had." (Friedman, 1968, page. 6)

According to Friedman it's precisely the reduction of the interest rate that allows the absorption of the amount of additional money by the economic system as a whole. The reduction in the interest rate then generates an increase in expenditure, which produces an upward price pressure. The latter causes an excess demand for money bringing the interest rate back to its natural or long-term level.

Differently from Friedman, in Ricardo's analysis of the convergence process, not only no reference is found to a functional relationship between interest rates and demand for money, but Ricardo does not assume either any sort of inverse relation between the rate of interest and spending[44].

Indeed, Ricardo's "applications to the Bank for money" do not appear to be viewed as a "demand for money" in the sense specified above, in so far as such loan applications are only intended to employ productively the money issued in the hope of each individual to increase his business. This would be possible for an individual or for a number of individuals, but it cannot generate any increase in the aggregate

[44] See on this Garegnani (1978, pp. 340-1)

volume of transactions, the latter depending on the stage reached by capital accumulation.

6.4 Hence, according to the arguments put forward by Ricardo, the increase in the price level would allow the economic system as a whole to absorb the increased amount of money injected into circulation. In spite of the fact that this increase allows the relationship between money and prices to return to its 'natural' level, the interest rate would not receive any upward pressure towards the normal level. Our argument could, however, give rise to a doubt in the reader: if the interest rate remains at the lower level - and thus the enterprise profit keeps higher than normal – would not this generate further requests for loans, even after the increase in prices, so as to push up the interest rate? In other words, would not the persistently higher enterprise induce a further demand for loans which, given the money supply, would eventually generate that excess of loan applications able to bring back the interest rate to its natural level?

Although this argument may apparently help to solve the problem we just raised, it shows at any rate some weaknesses which we will now put forward. First, when Ricardo speaks of the variable capable to bring the interest rate back to the natural level, he refers exclusively to the price level. There is no reference to additional circumstances, or to possible excesses of loan requests generated by the reduction in the interest rate.

If we admit that the variable which pushes the interest rate up is an excess demand for loans nothing would prevent in principle that upward pressure from operate immediately – assuming, so to speak, an infinite elasticity of the demand for loans to the interest rate – with the interest rate rapidly returning to the natural level. However, as already hinted at, such a kind of adjustment that would clearly conflict with Ricardo's claim that it is the price level which allows the interest rate to return to its natural level[45].
Further, Ricardo talks about the "applications to the Bank for money" claiming that "If they charge less than the market rate of interest, there is no amount of money which they might not lend,—if they charge more than that rate, none but

[45] Referring to this subject, Smith (2013) makes a contradictory statement: "Ricardo argued that the *demand for money* would rise indefinitely if the rate of interest was lowered in relation to the rate of profit by an increased issue of Bank Of England notes […].", soon after pointing out that "*Once the excess of money necessary to accommodate the price inflation has been absorbed by its demand*, then the rate of interest will be adjusted back up to the level of the rate of profit compatible with price stability." (Smith, 2013, pp. 181-2, italics added). If the demand for money (the "applications" quoted above) grows indefinitely after the reduction of the rate of interest below the natural level, it would be this endless increase in the demand for money which would produce the convergence, rather than the increase in prices Ricardo repeatedly referred to.

spendthrifts and prodigals would be found to borrow of them" (Ricardo, 1951, *Works*, Vol. I, p. 364, already quoted), thereby highlighting, on the one hand, that requests for loans would increase if the interest rate were to a level below that natural, and claiming on the other hand, always in the case in which the interest rate is lower than natural, that there are no limits to the issue of money by the banking system. In this regard, it is possible to understand the statement by Ricardo by placing it within the context of a circulating *fiat*-money. In this case "all checks to the over issue of notes were removed, excepting that which the Bank voluntarily placed on itself" (Ricardo, 1951, *Works*, Vol. III, p. 17, already quoted) so that if, following the increase in prices the interest rate would not return to the natural level and this generated a request for additional loans, the banking system would have no constraints to provide additional amounts of money since "there is no amount of money which they might not lend" and there would be no reason for the increase in the rate of interest.

Conversely, if Ricardo had in mind an economic system supporting the convertibility of banknotes into gold "No efforts of the Bank could keep more than a certain quantity of notes in circulation, and if that quantity was exceeded, its effects on the price of gold always brought the excess back to the Bank for specie." (Ricardo, 1951, *Works*, Vol. III, p. 16, already quoted). In the case of a convertibility regime there would be a constraint on an additional issue of money, represented by the gold reserves held by the banking system. This constraint is quite stringent as "This is the only check which can exist to an overissue from the Bank, and was so well known that the Bank never ventured on it with impunity." (Ricardo, 1951 *Works* , Vol. III). We could then assume that, in this case, any further request for loans, after an increase of prices, is able to allow the convergence process, as the banking system probably would not be willing to provide additional amounts of money at the lowest interest rate. As we shall see in the conclusions, however, Ricardo mentions an explanation of the convergence process in the case of gold convertibility of money, where the key determinant of the return of interest rates to the natural level should not be the price level.

7. Conclusions

According to what we said so far, the convergence process described by Ricardo seems to have general characteristics, i.e. not strictly dependent on a particular monetary system. Ricardo believes that an increase in prices is able to bring the interest rate to its natural level, but he does not specify whether such a process is applied to an economy where there is convertibility, inconvertibility or both. Ricardo also says that the only way for the banking system to enter an additional amount of money in circulation is via a reduction in the interest rate, and this is valid both in a system in which a commodity money and a *fiat* money circulates[46].

As far as we are concerned, based on the arguments above, we believe that an increase in the price level is not able to bring the market rate of interest back to the natural level and is therefore unable to operate the convergence mechanism of the first towards the second.

We can however assume - without any claim to be exhaustive – that actually Ricardo, thinks of an economic system where a *fiat* money circulates when he describes the convergence process of the market rate of interest to its natural rate. This could be supported by what follows:

a) Ricardo seems having clear in mind, in a convertibility regime, the interconnection between the role played by the rate of interest and the international price-specie-flow mechanism:

> "If the Bank had doubled its circulation, it still would have no permanent effect upon the value of money. If such a thing had taken place, the general level of interest would be restored in less than six months. The country only required, and could only bear, a certain circulation; and when that amount of circulation was afloat, *the rate of interest would find its wholesome and natural level*."(Ricardo, Speech on July 1, 1822; *Works*, 1951, Vol. V, pp. 222-3, italics added)

The price-specie-flow mechanism ensures, in Ricardo's opinion, that - in a regime of convertibility – the amount of money will ultimately be what "the country only required". This condition is also satisfied when the rate of interest converges toward its natural level[47]. Thanks to the gold flowing out of national borders, in fact, the amount of additional commodity money previously entered into circulation by

[46] Cf. Ricardo, 1951, Works, Vol. III, pag. 91, already quoted

[47] See on this Petri (1983, p. 18). The statement "the amount of money will be what the country only required" let us think that conceives the 'natural' quantity of money as a physically determined magnitude. A different opinion is expressed by Marcuzzo and Rosselli (2015), who claim that "the 'natural' level associates the quantity of money not to an equilibrium quantity of gold and to the relative value of gold in terms of commodities constant across countries, but to the equality of the purchasing power of gold relative to the currency at home and abroad. This means that the relative value of gold in terms of commodities may differ, while arbitrage on the international gold market equalizes the price of gold across countries." (Marcuzzo and Rosselli, 2015, p. 372) See on this also Quadrio Curzio (2015, p. 171)

means of a reduction of the interest rate, would be reduced to such an extent as to generate that excess of money demand, which would allow an increase in the market interest rate and, therefore, the convergence of the latter to its natural level.

The gold outflow is the counterpart of the purchase of foreign goods which have become more competitive. This does not allow the domestic producers to sell the quantities produced at the new higher prices. That is why there will be an increase in the demand for money by the same producers as the sales volume does not allow them to make payments set by contract (e.g., money wages). Thus, there is a shortage of liquidity in the economy. The banking system, however, is not willing to provide additional money at a lower interest rate, since gold reserves required to warrant the convertibility of banknotes would diminish. Hence competition between manufacturers will raise the interest rate back to its natural level.

This increase in the interest rate cannot, however, eliminate the excess demand for money, since, as we have seen, the idea of a decreasing functional relation between interest rate and demand for money seems to be absent in Ricardo. Only the decrease in price level, caused by an excess of aggregate supply with respect to the monetary expenditure, would allow the reduction in the demand for money, thereby allowing the new lower amount of money in circulation to be absorbed by the economic system. Hence, in this case, the price level could not ensure the convergence. In a convertibility regime the convergence process is ultimately effected by the commodity money outflow from the national borders, which would, moreover, ensure the return of the money stock to its natural level.

b) As we have been examining in the paper, Ricardo maintains that the price level ensures that the market interest rate returns to its natural level. He seem to hold this view at least until 1822, that is one year after the restoration of convertibility in England, when he provides a different explanation, in our view coherent, of the convergence process.[48] We might then presume that his reliance on the increase in prices for the tendency of the market rate of interest to the natural one is precisely based on the premise of the inconvertibility of banknotes into gold. In the latter case what can be defined is no longer a 'natural' quantity of money but rather a 'natural' ratio of *fiat* money to the price level (Ricardo, 1951, Works, Vol. III, p. 91, already quoted) determined on the basis of a given ratio of the volume of transactions to the velocity of money circulation. An exogenous increase in the quantity of money would cause, for a given profit rate, a fall of the rate of interest below its natural

[48] Ricardo, Speech on July 1, 1822, already quoted

level and an increase in the money-prices ratio above natural. According to Ricardo, the subsequent increase in prices would bring the latter ratio as well as the interest rate back to their natural levels. In the course of our discussion we have tried to show, however, that the convergence of the market interest rate put forward by Ricardo seems to show some inconsistencies, particularly with regard to the capacity of changes in the price level to guarantee that result.

We could ask, however, and this is a fundamental question, why under inconvertibility regime the process of convergence does not rely, according to Ricardo, on the outflow of money from the country. The reason might be looked for in the fact that in the case of *fiat* money Ricardo believes that the increase in domestic prices would not feed the outflow of money because, differently from would happen under convertibility, it would be accompanied by the fall of the exchange rate. (Ricardo, 1810-11, The High Price of Bullion, p. 64, already quoted)[49]

[49] The convertibility of notes generally entails fixed exchange rates linked to gold, and this possibly explains why in that case Ricardo does not seem to contemplate variations in the exchange rate in the face of changes in the domestic price level. See on this Ricardo, 1809, *The Price of Gold*, pp. 20-1, and also Ricardo, 1810-11, *The High Price of Bullion*, p. 64 footnote

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